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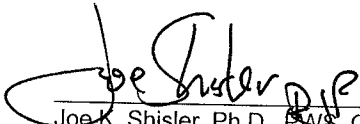
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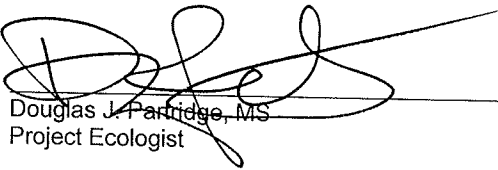
**Carteret Development LLC**

**Delineation of the Geographic  
Extent of Waters of the U.S.,  
Including Wetlands within Carteret  
Development LLC Impoundment  
Facility in Carteret, Middlesex  
County, New Jersey**

April 28, 2008

ARCADIS

  
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### Executive Summary

This report was developed by ARCADIS to provide a basis for federal and State of New Jersey determination of the location and geographic extent of federal and state jurisdictional waters and wetlands (waters/wetlands) on the Carteret Development LLC Impoundment facility (site) in the Borough of Carteret, Middlesex County, New Jersey. This delineation is intended to support the application package for re-verification of the Letter of Interpretation (LOI) originally approved in March 1998 and extended for an additional five years as of March 2003. Consistent with the New Jersey Department of Environmental Protection Freshwater Wetlands Protection Act Rules and the limit of a five year extension from the original approval of an LOI, ARCADIS re-delineated the waters/wetlands within the site in December 2007 and January 2008.

For the purposes of this delineation report, ARCADIS staff used (a) current federal definitions of "waters of the U. S., including wetlands" provided at (33 CFR 328.3(a)(1-8) and 328.3(b, c and e)) (Federal Register 1986), (b) technical criteria articulated in the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), and (c) Regulatory Guidance Letters 82-2, 86-9, 92-3 and 98-7. Regulatory Guidance concerning the identification of Ordinary High Water (OHW) was recently released by the U.S. Army Corps of Engineers (5-05).

Three waters/wetlands lines were delineated around the perimeter of the Carteret site, all of which were associated with salt marsh communities of the Rahway River and its tributaries. Only slight modifications were made by ARCADIS from the original delineation conducted by Shisler Environmental Consultants, Inc. in September 1997 (Shisler, 1997).

The information offered in this report is organized to describe the rationale and methodology for the delineation of waters/wetlands; and summarize results of the waters/wetland delineation, including the geographic extent of waters/wetlands.

## 1. Introduction

This report summarizes ARCADIS's findings of fact and judgments concerning the geographic extent of federal and state jurisdictional waters and wetlands (waters/wetlands) on the 104 acre Carteret Development LLC Carteret Impoundment facility (site) in the Borough of Carteret, Middlesex County, New Jersey. This delineation report is intended to support the application package for re-verification of the Letter of Interpretation (LOI) originally approved in March 1997 and extended for an additional five years in March 2003. The letters of approval and extension of the original LOI are included as Appendix A.

New Jersey Department of Environmental Protection (NJDEP) Freshwater Wetlands Protection Act Rules stipulate in Section 7:7A-3.6(a) & (b):

- (a). A person who is issued a letter of interpretation pursuant to this subchapter shall be entitled to rely on the determination of the Department, concerning the presence or absence, or the extent of freshwater wetlands and/or State open waters, for a period of five years from its issuance, unless the letter of interpretation is determined to have been based on inaccurate or incomplete information, in which case the Department may void the original letter of interpretation and issue a new letter of interpretation reflecting the actual conditions on the site...
- (b). The term of a letter of interpretation may be extended, provided that the information upon which the original letter was based remains valid, but shall not exceed five years from the original expiration date.

Consistent with the limit of a five year extension from the original approval of an LOI, ARCADIS re-delineated the waters/wetlands within the site in December 2007 and January 2008 to support re-verification of the LOI. This report and associated map products are conditional, pending a final determination by the NJDEP. Results and conclusions presented herein are based upon information provided by Cytec, readily available public domain information (i.e., U.S. Geological Survey 7.5' topographic quadrangles), the Natural Resources Conservation Service (formerly Soil Conservation Service) Soil Survey of Middlesex County, New Jersey (USDA-NRCS, 2006), aerial photographs from various sources, as well as our on-site reconnaissance, data collection, and analyses by standard methods. They represent the best professional judgment of ARCADIS.

The main objective for this delineation effort is to delineate the geographic extent of waters/wetlands within the site consistent with definitions provided in Code of Federal Regulations (CFR) 33 328.3 (a)(1-8), 328.3 (b, c, and e), and procedures detailed in the 1987 USACE *Wetlands Delineation Manual* (Environmental Laboratory, 1987)

(hereafter, 1987 Manual) as implemented, with pertinent regulatory guidance letters, memoranda, and public notices.

## 1.1 Site Description

The site is owned by Carteret Development LLC, a wholly-owned subsidiary of Cytec Industries Inc., and comprises approximately 104 acres of land in the Borough of Carteret, Middlesex County, New Jersey. More specifically, the site is located at approximately 2125400 Easting and 640850 Northing (New Jersey State Plan NAD 83) or as legal Block 9.03, Lot 21; Block 10, Lots 8, 9, 10, and 12 through 21; and Block 11.01, Lots 10 through 14. A site location map based of a U.S. Geologic Survey (USGS) quad map is included as Figure 1. A tax map with the site boundaries approximated is included as Appendix B. A site map based off a recent local street map is provided as Figure 2. The site is bounded by industrial land uses (i.e., fuel storage terminals) to the east, a commercial storage facility to the south, and the Rahway River and associated tributaries to the west and north.

Six (6) impoundments are present within the site (Figure 3). The six impoundments were constructed to contain waste sludge material associated with the Warners Plant, a former American Cyanamid Company manufacturing facility located across the Rahway River in Linden, New Jersey. The Warners Plant is not contiguous with the impoundment site. The impoundments were constructed above ground by American Cyanamid Company and operated during the interval of 1930 through 1974. Each impoundment is surrounded by a dike to contain all material and associated stormwater within the impoundment.

Pursuant to an agreement with the NJDEP memorialized in a 1978 Administrative Consent Order (ACO), American Cyanamid Company undertook to create and maintain suitable covers on each of the impoundments. With respect to those impoundments that had been filled to berm height (and thus did not collect stormwater), vegetative caps were installed. With respect to Impoundment 6, which was not filled to berm height, a water cover has been maintained to suppress potential airborne migration of impound materials. Both the Declaration of Environmental Restrictions, filed with respect to the site in 1995, and the NJDEP No Further Action Letter and Covenant not to Sue issued by the agency in 1992, require continued maintenance of the engineered caps and covers on the impoundments.

In its March 1998 approval of the Letter of Interpretation, Line Verification for the site, and its February 2006, reissuance and extension of the Letter of Interpretation, the



NJDEP first determined and then reaffirmed that the areas within impoundments 1 through 6 are not State open waters, waters of the United States, nor regulated wetland features. Through the "State open waters" definition (N.J.A.C. 7:7A-1.4), the NJDEP determined to presumptively exempt certain activities, reserving the right on a case-by-case basis to regulate such activities if the circumstance warrants. As the water cover on Impoundment 6 serves a remedial purpose, it falls within the general exemption for engineered (i.e., bermed) structures "incidental to ... remediation activity." It is our professional opinion that no events or circumstances have occurred to warrant any change in such determination and the Department's conclusions in 1998 and 2006. The 1998 LOI approval letter and 2006 extension letter are included as Appendix A.

### 1.2 Geomorphic Context

The waters/wetlands delineation focused along periphery of the site that is primarily tidally-influenced salt marsh associated with the lower Rahway River. The Rahway River is approximately 24 miles long, draining an area of approximately 41 square miles of Essex, Middlesex, and Union counties. Immediately downstream of the site, the Rahway converges with the Arthur Kill. The Arthur Kill is a tidal straight between New Jersey and Staten Island, and connects Raritan Bay on its south end to Newark Bay to its north.

The site is underlain by two distinct parent materials. The central portion of the site which the impoundments were constructed upon have an underlying parent material of sandy lateral spread deposits. The tidal marshes, characterized by deep organic soils, have a parent material consisting of herbaceous organic material over loamy soils.

Topography on the site is nearly level throughout the site. As mentioned above, the site is predominantly influenced by historical land-use(s) and construction of the six impoundments associated with the Warners Plant on the north side of the Rahway River.

### 1.3 Climate and Growing Season

The climate in the Carteret area is characterized by long hot summers, and cold winters. Temperature in the Carteret area is moderated by its proximity to the Atlantic Ocean coastline. Mean annual precipitation in Carteret ranges from 24-48 inches. Mean annual temperatures range from 48-55 degrees Fahrenheit. The warmest month of the year is July with an average maximum temperature of 86 degrees Fahrenheit,

while the coldest month of the year is January with an average minimum temperature of 20 degrees Fahrenheit. Data referenced above is derived from Middlesex County soil survey (USDA NRCS, 1987).

The length of the growing season influences the evaluation of wetland hydrology. The United States Department of Agriculture (USDA) and the Natural Resources Conservation Service currently define the growing season as the portion of the year when soil temperature at 19.7 inches below the soil surface is higher than biological zero (41 degrees Fahrenheit [°F] or 5° Celsius [°C]) (USDA Soil Conservation Service [SCS], 1991). If soil temperature data are not available, current national guidance for the delineation of waters/wetlands is to use the closest and best available weather station data to estimate the length of the growing season (USACE, 1992).

Soil temperature data were not collected from the facility. Therefore, climate data from the Middlesex County soil survey (USDA NRCS, 1987) were used. These data indicate a frost free period of 180 to 200 days using the 32 °F standard. Consistent with USACE Regulatory Guidance Letter 92-3 (and, therefore, the 1987 Manual), this means that in order to satisfy the hydrology parameter for wetlands, wetland soils on the site need to be saturated to the surface for at least 9 to 10 days (5%) of the growing season (using the 32 °F standard).

## 2. Methods

### 2.1 Rationale for the Routine Delineation of the Geographic Extent of Waters/Wetlands

Waters/wetlands were delineated within the site using "routine" methods recommended in the 1987 Manual. Based upon guidance provided in the 1987 Manual and in Regulatory Guidance Letters 82-2, 86-9, 90-7, 92-3 and 98-7, waters/wetlands that have been disturbed through natural and/or anthropogenic alteration of hydrology, soils, and/or vegetation do not necessarily exist under "normal circumstances." Best professional judgment was used to determine that no circumstances exist that would require an atypical approach for this site.

### 2.2 Delineation Methods

#### 2.2.1 Office Methods

Prior to the field delineation, existing information relative to the site was collected and reviewed. Information included, but was not limited to, the U.S. Geological Survey (USGS) 1:24,000 maps (i.e., Arthur Kill, NY-NJ), aerial photography, Soil Survey of Middlesex County (USDA-NRCA, 1987 & 2006), regional climate data, and national and local (county) hydric soils lists.

#### 2.2.2 Field Delineation

Field work was performed by ARCADIS personnel on the site during two separate field visits: December 11 and 12, 2007 and January 21, 2008. Field personnel included Dr. Joseph K. Shisler and Mr. Douglas Partridge, with resumes provided as Appendix C. Waters/wetlands boundaries were identified in the field with pink "waters/wetlands boundary" flags. Crest Engineering, a New Jersey licensed surveyor, subsequently surveyed the waters/wetlands line. Representative sample plots were established to document conditions in the delineated waters/wetlands, as well as representative upland areas, and marked in the field with pink and black striped flagging.

Protocols for field identification of wetland hydrology, hydric soils and hydrophytic vegetation are provided in the *1987 Manual*. ARCADIS used these protocols as the basis for waters/wetlands delineation on the site. The following paragraphs describe how each wetland parameter (e.g., hydrology, soils, vegetation) was evaluated.

#### 2.2.2.1 Hydrology

The term wetland hydrology encompasses hydrologic characteristics of areas that are periodically inundated or that have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and reducing conditions (Environmental Laboratory, 1987).

Wetland hydrology was evaluated at the site by using primary and secondary indicators, consistent with the 1987 Manual protocols and current regulatory guidance (i.e., USACE 92-03 Memorandum). Direct indicators, such as stream/lake gage data, flood predictions (i.e., FEMA maps), and historic records can be used to satisfy the wetland hydrology parameter (Environmental Laboratory, 1987). No recorded data (e.g., stream/lake gauge data, flood predictions, and historical records) were available to assess the wetland hydrology parameter on the site. However, the wetland hydrology parameter can also be satisfied by using field observations of primary and secondary indicators that include, but are not limited to, visual observation of inundation and/or saturation, sediment deposition, drainage patterns in wetlands, hydric soil characteristics, watermarks, drift lines, oxidized channels (i.e., rhizospheres) associated with living roots and rhizomes, and water-stained leaves (Environmental Laboratory, 1987).

#### 2.2.2.2 Soils

Soils at the site were evaluated for the hydric parameter consistent with criteria articulated in the 1987 Manual, current regulatory guidance, and U.S. Department of Agriculture Natural Resource Conservation Service (USDA - NRCS) guidelines (1996, 1998) as well as County and national hydric soils lists. Hydric soils are defined as "...soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (National Technical Committee for Hydric Soils [NTCHS], 1994).

A decision on whether or not a soil is hydric is based on the fulfillment of at least one of four technical criteria published in the 1996 Supplement to Hydric Soils of the United States (USDA - NTCHS, 1996) (Table 1). Technical criteria can be satisfied using a combination of published soils information and field indicators. Field indicators for assessing whether a soil satisfies the hydric soil definition and the technical criteria for hydric soils are listed in the Field Indicators of Hydric Soils in the United States (USDA

- NRCS, 1996, 1998). Field indicators published in this document are intended to update guidance provided in the *1987 Manual* (online edition).

#### 2.2.2.3 Vegetation

Hydrophytic vegetation is the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation and/or soil saturation produces anaerobic conditions within soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory, 1987). According to the *1987 Manual*, the hydrophytic vegetation parameter for waters/wetlands is met when, under normal circumstances, more than 50% of the dominant species from each vegetative stratum (i.e., a distinctive vertical layer of vegetation that can be identified in a given plant community) are obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC) species. In certain circumstances, the 1987 Manual calls for inclusion of a plus (+) or a minus (-) sign for the purpose of designating a higher or lower level of the indicator status. A FAC- indicator status is generally not considered to be an indicator of hydrophytic vegetation (i.e., it is treated in the same way as a facultative upland (FACU), upland (UPL), or not listed (NL) species. Standard definitions for indicator status categories are presented in Table 2. All nomenclature is consistent with the *Flora of the Northeast* (Magee and Ahles, 1999).

### 3. Results

The results discussed in this report focus on the findings of fact and judgment of the ARCADIS field team from the 2007/2008 waters/wetlands delineation. A site wide waters/wetlands map is presented as Figure 3 and Exhibit 1. A general description of the delineated waters and wetlands, with emphasis on the hydrology, soils, and vegetative communities, is provided below. Completed Routine Wetland Determination Data Sheets from the eleven sample plots are provided in Appendix D.

#### 3.1 National Wetland Inventory

As part of the delineation effort, the National Wetland Inventory (NWI) layer on the National Map Viewer (<http://nmviewogc.cr.usgs.gov/viewer.htm>) for the site was reviewed. NWI maps are based on interpretation of aerial photography, limited verification of mapped units, and/or classification of wetland types using the classification system developed by Cowardin et al. (1979). NWI maps are available for general information purposes and do not necessarily correspond to jurisdictional waters/wetlands as defined in the 1987 Manual. The NWI map for the site and adjacent parcels is included as Appendix E.

A number of different classed wetlands are mapped on or proximate to the site. The predominant wetland class is an estuarine, intertidal wetland. These wetlands are differentiated as unconsolidated shoreline that is regularly flooded (E2USN), and emergent, persistent, and irregularly flooded (E2EM1P). Both wetlands classes are associated with the Rahway River and its tributaries. The impoundments with water cover / caps are mapped as palustrine, unconsolidated, permanently flooded, diked/impounded wetlands (PUBHh). Finally, one small portion of Impoundment 1 is mapped as palustrine emergent forested wetland.

#### 3.2 Federal Emergency Management Agency Floodplain

A Federal Emergency Management Agency (FEMA) floodplain map is not available for areas within Middlesex County.

### 3.3 Description of Existing Conditions

#### 3.3.1 Hydrology

Hydrologic inputs to the site include tidal influence, direct precipitation, surface and overbank flow via defined stream channels and swales, and surface and shallow subsurface flow from neighboring parcels to the east. The outlying portions of the site are characteristic salt marsh communities associated with the Rahway River. These areas are bordered by maintained levees designed to contain all surface and subsurface water within the six impoundments. As mentioned above, multiple impoundments are designed to have a permanent water cover as mandated by an ACO with the NJDEP. Based on federal and state regulations, these impoundments do not meet the definition of either Waters of the U.S., or State open waters, respectively.

The Rahway River is 24 miles long and drains an area of approximately 41 square miles of Essex, Middlesex, and Union counties. The Rahway is a tributary to the Arthur Kill, and is in the Passaic, Hackensack, and New York Harbor Complex Basin. The reach of the Rahway River bordering the site is classified as a "saline estuarine waters" (SE2) by the NJDEP, Office of Land and Water Planning, April 1994, Surface Water Quality Standards N.J.A.C. 7:9. The Arthur Kill is a tidal straight between New Jersey and Staten Island, also classified as a "saline estuarine waters"

#### 3.3.2 Soils

The USDA NRCS, Middlesex County Soil Survey (2006), included as Appendix F, identifies two soil mapping units within the site. The two soil units include: Psammments, waste substratum, 0 to 8 percent slopes, and Transquaking mucky peat, 0 to 1 percent slopes, very frequently flooded. Both are described below.

Psammments series consist of moderately deep to deep, excessively drained to somewhat poorly drained soils that formed in stratified or graded sandy fill material. These soils are characteristically 20 to 60 inches deep to the native soil horizon or waste fill. They are extremely acid to very strongly acid, consisting of dredged material principally from the South River and the Raritan River. There are a wide range of soil characteristics from texture to thickness.

Transquacky mucky peats are very poorly drained, deep organic soils. The parent material is herbaceous organics over loam. Transquacky mucky peats are

characteristically found in tidal salt marshes, and are often times greater than 80 inches deep, and are frequently flooded.

Finally, urban lands are also mapped proximate to the site. They consist of areas where more than 80 percent of the surface is covered by industrial plants, shopping and business centers, and other structures. These areas are mostly nearly level to moderately sloping, but a few are strongly sloping and steep. Fill material has been used in places to build up wet soils. Most areas have been excavated or filled with material that is now almost totally paved. These areas generally correspond to the fuel holding fields to the east of the site.

### 3.3.3 Vegetation

Three distinct vegetative communities were observed within the site, including: (1) low to high salt marsh, (2) fragmented woodland, and (3) an early successional ruderal shrub/herbaceous community. The majority of the species observed in and proximate to the impoundments are a result of a management program approved by the state to control erosion. All three communities are described in detail below.

The salt marsh communities associated with the Rahway River were dominated by a number of graminoid species: smooth cordgrass (*Spartina alterniflora*), big cordgrass (*S. cynosuroides*), saltmeadow cordgrass (*S. patens*), common reed (*Phragmites australis*), and saltgrass (*Distichlis spicata*). Two shrub species were commonly found in the high marsh to upland transitional areas: big-leaf sumpweed (*Iva frutescens*) and eastern false willow (*Baccharis halimifolia*). All of the above species are native to New Jersey, with the exception of common reed. A number of upland transitional tree species common to disturbed areas, were also observed along the fringes of the salt marsh: tree of heaven (*Ailanthus altissima*), black cherry (*Prunus serotina*), black locust (*Robinia pseudo-acacia*), and Honey locust (*Gleditsia triacanthus*). The understory in these transitional areas were dominated by, but not limited to: eastern false willow, oriental bittersweet (*Celastrus orbiculatus*), seaside goldenrod (*Solidago sempervirens*), annual saltmarsh aster (*Aster subulatus*) poison ivy (*Toxicodendron radicans*), multi-flowered rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), oxeye daisy (*Chrysanthemum leucanthemum*), moth mullen (*Verbascum blattaria*), and small-flower white morning glory (*Ipomoea lacunosa*).

The dominant plant across the six impoundments was common reed. However, many other species were observed in abundance and are characteristic of a disturbed, ruderal plant community. Common species observed include: eastern false willow,



common mugwort (*Artemisia vulgaris*), moth mullen, pokeweed (*Phytolacca americana*), broom sedge (*Andropogon virginicus*), butter and eggs (*Linaria vulgaris*), curled dock (*Rumex crispus*), crown vetch (*Coronilla varia*), common milkweed (*Asclepias syriaca*), oxeye daisy, spreading dogbane (*Apocynum androsaemifolium*), seaside goldenrod, white sweet clover (*Melilotus alba*), and yellow sweetclover (*Melilotus officinalis*).

A small woodland area exists in the eastern portion of Impoundment 5. Dominant trees include eastern cottonwood (*Populus deltoids*) and silver birch (*Betula papyrifera*).

### 3.4 Description of Waters/Wetlands

Three (3) waters/wetlands lines were delineated around the perimeter of the site. Waters/Wetlands #1 is a salt marsh community extending around the outer margins of Impoundments 2 through 6. Waters/wetlands #2 is also a salt marsh extending around a tidally influenced channel and associated ditch proximate to the bridge at the entrance to the site. Finally, Waters/wetlands #3 is a salt marsh extending around the periphery of Impoundment 1. Eleven sample plots were established throughout the site, 7 of which were located in wetlands and 4 within representative upland areas. Each sample plot is described in detail below, and completed Routine Wetland Determination Data Sheets are provided in Appendix D.

#### 3.4.1 Waters/Wetlands #1

Waters/wetlands #1 extends around a tidally influenced channel and associated ditch proximate to the bridge at the entrance to the site. The wetland line begins at the fence line proximate to the entrance gate, heads in a northerly direction along a man-made ditch, and then heads west along a tidally influenced channel below the bridge to a fence along the southern property boundary just west of the bridge.

##### 3.4.1.1 Transect #1

Sample plot #1 along Transect 1 was established to document upland conditions immediately east of the entry road into the site. Dominant plant species included common reed (FACW), saltgrass (FACW+), path rush (*Juncus tenuis*) [FAC-], seaside goldenrod (FACW), and eastern false willow (FACW). Eighty percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. While the hydrophytic vegetation criterion was met in this sample plot, wetland hydrology and hydric soils were not identified. No primary or secondary

indicators of wetland hydrology could be found in this sample plot. Soils documented at this sample plot were characteristic fill materials associated with the site access road proximate to the sample plot. The upper twelve inches had a dark reddish brown soil matrix color of 2.5YR 3/4. Hydric soil field indicators were not observed (USDA-NRCS 1996 and 1998 updated with on-line Version 5.9), and technical criteria for hydric soils as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987) were not met.

Sample plot #2 was established to document wetland conditions in a salt marsh community associated with a small tidally influenced tributary to the Rahway River. The vegetative community was dominated by common reed (FACW), smooth cordgrass (OBL), big cordgrass (OBL), saltmeadow cordgrass (FACW+), and saltgrass (FACW+). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. Primary and secondary indicators of wetland hydrology were documented in Sample plot #2, meeting the criterion for wetland hydrology. Indicators included water to the soil surface, water marks, drift lines, drainage patterns in wetlands, and oxidized root channels in upper 12 inches. Finally, the mapped Transquacky mucky peat was confirmed. Soil at this location consisted of a black to dark brown (10 YR 3/2) organic horizon to a depth greater than 12 inches. These soils meet the hydric soil parameter by being a histosol, with a sulfidic odor, and having documented reducing conditions as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987).

#### 3.4.2 Waters/Wetlands #2

Waters/wetlands #2 begins in the southeastern corner of Impoundment 2, extends around the periphery of Impoundments 3 through 6, and ends in the northeastern corner of Impoundment 2. All wetlands are tidally influenced salt marsh communities associated with the Rahway River. Four transects were established along the wetland boundary. Each sample plot is described in detail below.

##### 3.4.2.1 Transect #2

Sample plot #3 along Transect 2 was established to document wetland conditions along the western boundary of Impoundment 3. The vegetative community was dominated by big cordgrass (OBL), smooth cordgrass (OBL), saltmeadow cordgrass (FACW+), spear saltbrush (*Atriplex patula*) [FACW], and saltgrass (FACW+). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. Observed primary and secondary

indicators of wetland hydrology included water at the soil surface, water marks, drift lines, drainage patterns in wetlands, and oxidized root channels in upper 12 inches, and thus met the criterion for wetland hydrology. Mapped Transquacky mucky peats were again confirmed. Soil at this location consisted of a black to dark brown (10 YR 3/2) organic horizon to depth greater than 12 inches. The soil at this location meets the hydric soil parameter by being a histosol, with a sulfidic odor, and having documented reducing conditions as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987).

Sample Plot #4 was established along the western perimeter of Impoundment 3 in a characteristic upland community. Dominant plant species included big-leaf sumpweed (FACW+), seaside goldenrod (FACW), annual salt marsh aster (OBL), common reed (FACW), and saltgrass (FACW+). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. However, no primary or secondary indicators of wetland hydrology could be found in this sample plot. In addition, soils documented at this sample plot were characteristic fill materials associated with the impoundment cap. The upper 6 inches had a bright soil matrix color of 10YR 3/3. The B horizon with a depth of 6 – 12 inches had a matrix color of 2.5YR 4/6. Hydric soil field indicators were not observed (USDA-NRCS 1996 and 1998 updated with on-line Version 5.9), and technical criteria for hydric soils as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987) were not met.

#### 3.4.2.2 *Transect #3*

Sample plot #5 was established to document wetland conditions along the southwestern boundary of Impoundment 4. The vegetative community was dominated by saltmeadow cordgrass (FACW+), smooth cordgrass (OBL), saltgrass (FACW+), and common reed (FACW). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. Observed primary and secondary indicators of wetland hydrology included standing water at 2 inches below the soil surface, saturation to soil surface, water marks, and oxidized root channels in upper 12 inches, and thus met the criterion for wetland hydrology. Transquacky mucky peat was again confirmed within Sample plot #5. The soil matrix color was Gley 4/N, and was determined to be a histosol, with a sulfidic odor, and had documented reducing conditions. Thus, the soil was determined to be a hydric soil as defined in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987).

Sample Plot #6 was established along the southwestern perimeter of Impoundment 4 in a characteristic upland community. Dominant plant species included common reed (FACW), bull thistle (*Cirsium arvense*) [FACU], eastern false willow (FACW), poison ivy (FAC), multiflowered rose (FACU), and black cherry (FACU). Less than 50 percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), and thus did not meet the hydrophytic vegetation criterion. No primary or secondary indicators of wetland hydrology were identified. Soils documented at this sample plot were characteristic fill materials associated with the impoundment cap. The A horizon (0.5 – 4 inches) was a red clay with a soil matrix color of 10YR 4/6, and the B horizon was mixed fill with a similar matrix color. Hydric soil field indicators were not observed (USDA-NRCS 1996 and 1998 updated with on-line Version 5.9), and technical criteria for hydric soils articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987) were not met.

#### 3.4.2.3 Transect #4

Sample plot #7 along Transect 4 was established to document upland conditions along the northeastern boundary of Impoundment 4. Dominant plant species included tree of heaven (NI), oriental bittersweet (UPL), Japanese honeysuckle (FAC-), common reed (FACW), and seaside goldenrod (FACW). Less than 50 percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), and thus did not meet the hydrophytic vegetation criterion. No primary or secondary indicators of wetland hydrology were identified. Soils documented were characteristic fill materials associated with the impoundment cap. The upper five inches had a dark brown soil matrix color of 7.5YR 3/4, and the lower seven inches with a yellowish brown matrix color (10YR 5/6). Hydric soil field indicators were not observed (USDA-NRCS 1996 and 1998 updated with on-line Version 5.9), and technical criteria for hydric soils articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987) were not met.

Sample plot #8 was established to document wetland conditions along the northeastern boundary of Impoundment 4. Dominant plant species included saltmeadow cordgrass (FACW+), and smooth cordgrass (OBL). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. Primary and secondary indicators of wetland hydrology observed included saturation to the soil surface, water marks, drift lines, and oxidized root channels in upper 12 inches, and thus met the criterion for wetland hydrology. Transquacky mucky peat was again confirmed. The upper three inches had dark brown soil matrix color (10YR 3/3). The soil matrix color from 3 to 12 inches again

had a soil matrix color of Gley 3/5B. The soil at this location met the hydric soil parameter by being a histosol, with a sulfidic odor, and having documented reducing conditions as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987).

#### 3.4.2.4 Transect #5

Sample plot #9 was established to document upland conditions along the northeastern boundary of Impoundment 2. Dominant plant species included black locust (FACU-), eastern false willow (FACW), white snakeroot (*Ageratina altissima*) [FACU], and an unidentified fescue (*Festuca* sp.). Less than 50 percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), and thus did not meet the hydrophytic vegetation criterion. No primary or secondary indicators of wetland hydrology were identified. Soils documented were again characteristic clay fill materials associated with the impoundment cap. The upper twelve inches had a dark yellowish brown soil matrix color of 10YR 3/6. Hydric soil field indicators were not observed (USDA-NRCS 1996 and 1998 updated with on-line Version 5.9), and technical criteria for hydric soils articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987) were not met.

#### 3.4.3 Waters/Wetlands #3

Waters/wetlands #3 is a salt marsh community extending around the periphery of Impoundment 1. The wetland line begins at the property boundary in the southwest corner, and continues around the impoundment to the southeast corner. Upland access to the impoundment is gained through the parcel to the east owned by Kinder Morgan. Please note an upland sample plot was not established in this region to avoid sampling within the impoundment.

##### 3.4.3.1 Transect #6

Sample plot #10 was established to document wetland conditions along the western boundary of Impoundment 1. Dominant plant species included common reed (FACW), smooth cordgrass (OBL), and big cordgrass (OBL). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. Primary and secondary indicators of wetland hydrology observed included saturation to the surface, water marks, drift lines, and oxidized root channels in the upper 12 inches, thus meeting the wetland hydrology criterion. Transquacky mucky peat was again confirmed. The upper three inches had

dark brown soil matrix color (10YR 3/2). The soil matrix color from 3 to 12 inches had a gleyed 3/5PB color. The soil at this location meet the hydric soil parameter by being a histosol, with a sulfidic odor, and having documented reducing conditions as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987).

Sample plot #11 was established to document wetland conditions along the northern boundary of Impoundment 1. Dominant plant species included annual salt marsh aster (OBL), common reed (FACW), smooth cordgrass (OBL), and big cordgrass (OBL). One hundred percent of the dominant species were OBL, FACW, or FAC (excluding FAC-), meeting the hydrophytic vegetation criterion. Primary and secondary indicators of wetland hydrology observed included saturation to the surface, water marks, drift lines, and oxidized root channels in the upper 12 inches, thus meeting the wetland hydrology criterion. Transquacky mucky peat was again confirmed. The upper one inch had dark brown soil matrix color (10YR 3/3). The soil matrix color from 1 to 12 inches had a gleyed 3/5B color. The soil at this location meet the hydric soil parameter by being a histosol, with a sulfidic odor, and having documented reducing conditions as articulated in paragraph 44.f(2)(a)-(b) in the 1987 Manual (Environmental Laboratory 1987).

#### **4. Geographic Extent of Waters/Wetlands and Classification of NJDEP Resource Value**

Three (3) waters/wetlands lines were delineated by ARCADIS within the Carteret Development LLC Carteret Impoundment Facility in December 2007 / January 2008. All wetlands were associated with tidally influenced salt marsh communities associated with the Rahway River and its tributaries. Site photographs are included as Appendix G.

Based on the previous LOI extension approval letter from Mr. Christopher Jones (Appendix A), NJDEP determined that the delineated wetlands on the site were of both exceptional and intermediate resource value. In summary, the majority of delineated wetlands were determined to be of exceptional resource value with the exception of the south, east, and west boundaries of Impoundment 1 (Waters/wetlands #3). In addition, a small inlet along the northern boundary of Impoundment 5 (Waters/wetlands #1) was also considered to be of intermediate resource value. Please note, intermediate resource value wetlands mandate a 50-foot buffer and exceptional resource value wetlands mandate a 150 foot buffer.

This report and associated map products are conditional, pending a final determination by the NJDEP, Land Use Regulation Program. In accordance with an agreement between the Program and the U.S. Army Corps of Engineers Philadelphia and New York Districts, the Land Use Regulation Program is the lead agency for establishing the extent of State and federally regulated waters/wetlands. Any alteration to the waters/wetlands and within the transition zones (i.e., buffer) will require a permit from the Program pursuant to the Freshwater Wetlands Protection Act (N.J.S.A. 13.9B).

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<http://soils.usda.gov/use/hydric/criteria.html>.
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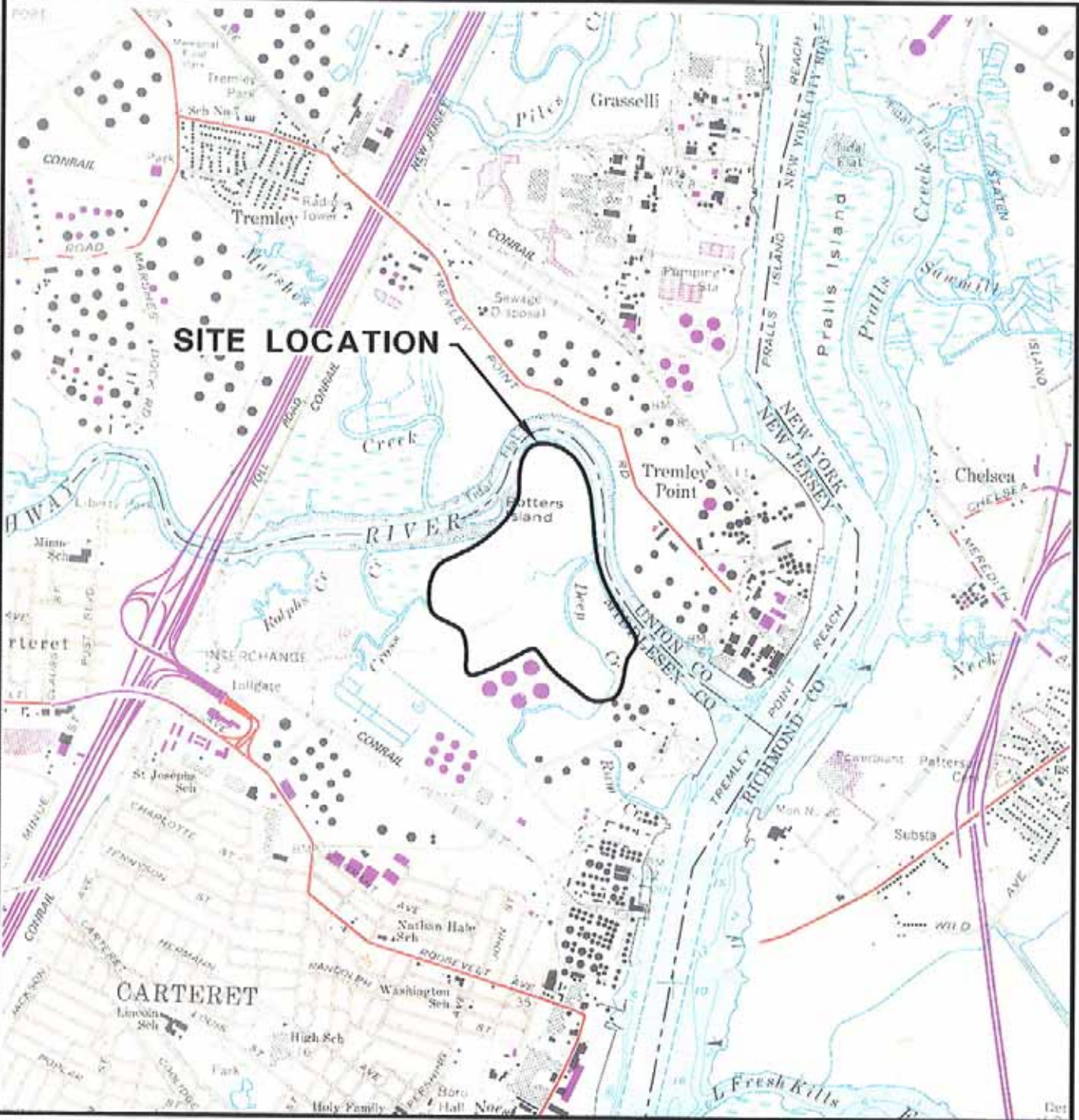
**Table 1. Criteria for Hydric Soils of the United States. (NRCS, <http://soils.usda.gov/use/hydric/criteria.html> ).**

1. All Histels except Folistels and Histosols except Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that are:
  - a. Somewhat poorly drained with a water table equal to 0.0 foot (ft) from the surface during the growing season, or
  - b. Poorly drained or very poorly drained and have either:
    - (1) a water table at 0.0 ft during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches(in), or for other soils
    - (2) a water table at less than or equal to 0.5 ft from the surface during the growing season if permeability is equal to or greater than 6.0 in/hour(h) in all layers within 20 in, or
    - (3) a water table at less than or equal to 1.0 ft from the surface during the growing season if permeability is less than 6.0 in/h in any layer within 20 in, or
3. Soils that are frequently ponded for long duration or very long duration during the growing season, or
4. Soils that are frequently flooded for long duration or very long duration during the growing season.

Table 2. U.S. Fish & Wildlife Service Plant Indicator Status (Reed, 1988).

Indicator Status	Definition
Obligate Wetland (OBL)	Occur almost always (estimated probability > 99%) under natural conditions in wetlands.
Facultative Wetland (FACW)	Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
Facultative (FAC)	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
Facultative Upland (FACU)	Usually occur in non-wetlands, but occasionally found in wetlands (1%-33%).
Obligate Upland (UPL)	Occur rarely in wetlands, but occur almost always (estimated probability > 99%) under natural conditions in non-wetlands in the region specified.
No Indicator Status (NI)	Insufficient information exists to assign an indicator status.
Not Listed (NL)	Not on the National List in any region.
*	Asterisk indicates the indicator status is under review within the region.

CITY: CRA DWG: 2008-10-10-AM ACADVER: 17.00 (LUS TECH) PAGES: 2/22008-10-10-AM PLOT: 2102008-10-11-AM BY: FATTO, TROZEE  
 G:\CADD\PROJECTS\WATER\B0044\DWG\B0044\134-001.dwg LAYOUT: LAYOUT1 SAVED: 2/22008-10-10-AM ACADVER: 17.00 (LUS TECH) PAGES: 2/22008-10-10-AM PLOT: 2102008-10-11-AM BY: FATTO, TROZEE  
 XREFS: IMAGES: PROJECT NAME: 44134001.DWG



**SOURCE:**  
 ARTHUR KILL QUADRANGLE, NY-NJ  
 7.5 MINUTE SERIES  
 CONTOUR INTERVAL 10 FEET

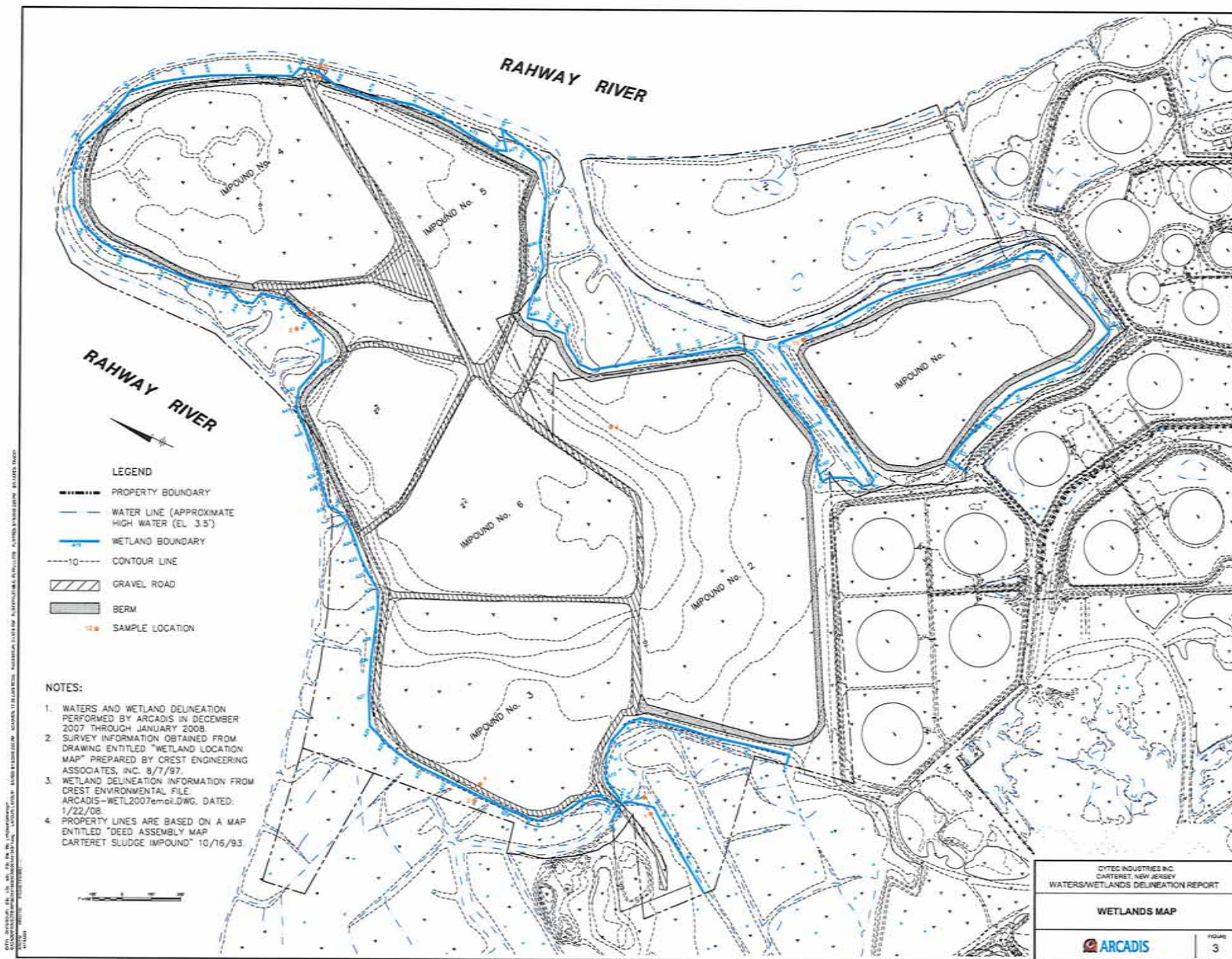


CYTEC INDUSTRIES INC. CARTERET, NEW JERSEY <b>WATERS/WETLANDS DELINEATION REPORT</b>	
<b>USGS SITE LOCATION MAP</b>	
	FIGURE <b>1</b>









ARCADIS

## Appendix A

Previous Letters of LOI Approval and  
Extension

**State of New Jersey**

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE  
*Governor*LISA P. JACKSON  
*Acting Commissioner*Division of Land Use Regulation  
P.O. Box 439, Trenton, NJ 08625-0439  
Fax # (609) 777-3656  
[www.state.nj.us/dep/landuse](http://www.state.nj.us/dep/landuse)Mr. Andrew Johnson  
Blasland, Bouck & Lee, Inc.  
8 South River Road  
Cranbury, NJ 08512

RECEIVED

FEB 27 2006

THOMAS E. MESEVAGE

RE: Line Verification - Reissuance  
File No.: 1201-03-0003.1.1FWW030001  
Applicant: Cytec Industries Inc.  
Block: 10; Lots: 8, 9, 10 & 12 through 21  
Block: 11.01; Lots: 10 through 14  
Carteret; Middlesex County

Dear Mr. Johnson,

The New Jersey Department of Environmental Protection issued a Letter of Interpretation for the referenced site on March 13, 1998. You have requested that the Letter of Interpretation be reissued in accordance with the requirements at N.J.A.C. 7:7A-3.6.

In accordance with agreements between the State of New Jersey Department of Environmental Protection, the U.S. Army Corps of Engineers Philadelphia and New York Districts, and the U.S. Environmental Protection Agency, the NJDEP, Land Use Regulation Program is the lead agency for establishing the extent of State and Federally regulated wetlands and waters. The USEPA and/or USACOE retain the right to reevaluate and modify the jurisdictional determination at any time should the information prove to be incomplete or inaccurate.

Based upon the information submitted, the Land Use Regulation Program has determined that the wetlands and waters boundary line(s) as shown on the plan entitled "**CYTEC INDUSTRIES INC. CARTERET, NEW JERSEY FRESHWATER WETLANDS LETTER OF INTERPRETATION EXTENSION WETLAND DELINEATION MAP**", dated April 4, 2003, unrevised, and prepared by Blasland, Bouck and Lee, Inc., is accurate as shown. Therefore the term of the original Letter of Interpretation is hereby extended to March 13, 2008, which is five years from the expiration of the original Letter of Interpretation.

Any activities regulated under the Freshwater Wetlands Protection Act proposed within the wetlands or transition areas or the deposition of any fill material into any water area, will require a permit from this office unless exempted under the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq., and implementing rules, N.J.A.C. 7:7A.



The freshwater wetlands and waters boundary line(s), as determined in this letter, must be shown on any future site development plans. The line(s) should be labeled with the above LURP file number and the following note:

"Freshwater Wetlands/Waters Boundary Line as verified by NJDEP."

The Department has determined that the wetlands on the subject property are of both exceptional and intermediate resource value. The wetlands along the following points are of exceptional resource value: B1 to B7; A1 to A55; A58 to A81; A6 to A18. The standard transition area or buffer required adjacent to exceptional resource value wetlands is 150 feet. All remaining wetlands are of intermediate resource value and have a 50-foot buffer. In addition, it has been determined that the areas within impoundments 1 through 6 are not State open waters pursuant to the definition at N.J.A.C. 7:7A-1.4, and therefore are not regulated wetland features. This classification may affect the requirements for an Individual Wetlands Permit (see N.J.A.C. 7:7A-7), the types of Statewide General Permits available for the wetlands portion of this property (see N.J.A.C. 7:7A-5) and the modification available through a transition area waiver (see N.J.A.C. 7:7A-6). Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing rules for additional information.

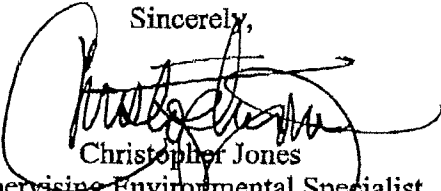
It should be noted that this wetland classification is based on the best information presently available to the Department. The classification is subject to change if this information is no longer accurate, or as additional information is made available to the Department, including, but not limited to, information supplied by the applicant.

This letter in no way legalizes any fill that may have been placed, or other regulated activities that may have occurred on-site. Also this determination does not affect your responsibility to obtain any local, State, or Federal permits which may be required.

In accordance with N.J.A.C. 7:7A-1.7, any person who is aggrieved by this decision may request a hearing within 30 days of the decision date by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, P.O. Box 402, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist.

Please contact Allison Giehl of our staff at (609) 633-6754 should you have any questions regarding this letter. Be sure to indicate the Program's file number in all communication.

Sincerely,



Christopher Jones  
Supervising Environmental Specialist  
Bureau of Inland Regulation

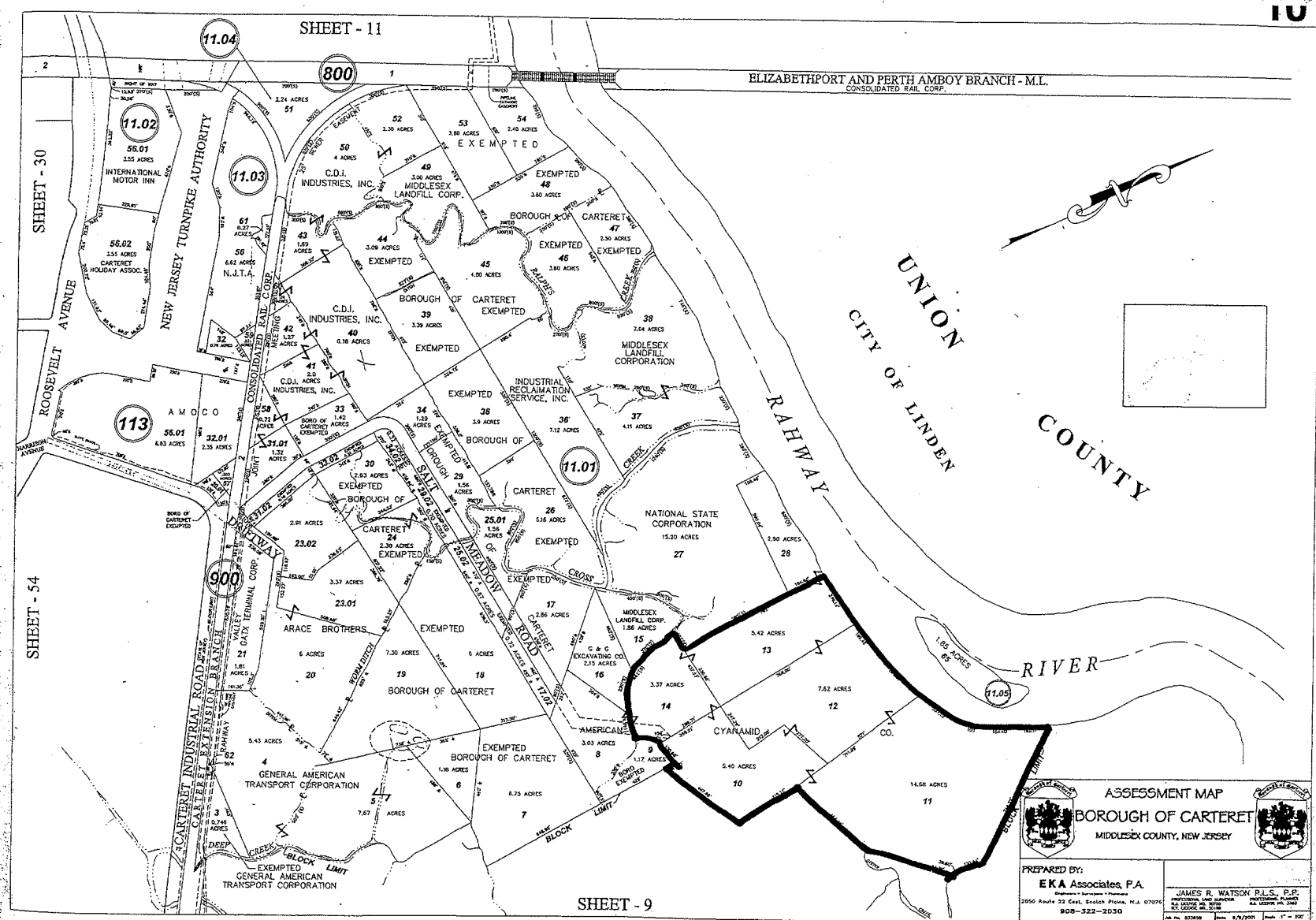
- c. Carteret Municipal Clerk  
Carteret Construction Official

ARCADIS

Appendix B

Borough of Carteret 2001 Tax  
Assessment Map





**ASSESSMENT MAP**  
**BOROUGH OF CARTERET**  
MIDDLESEX COUNTY, NEW JERSEY

PREPARED BY:  
**EKA Associates, P.A.**  
2050 Route 22 East, Scotch Plains, N.J. 07076  
908-322-2030

**JAMES R. WATSON P.L.S., P.R.**  
Professional Land Surveyor  
No. 14076, State of New Jersey  
44 North 9th Street  
Scotch Plains, N.J. 07076  
6/9/2001 1" = 300'

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Appendix C

ARCADIS Staff Resumes

**Education**

PhD/Zoology, Rutgers  
University, 1975  
MA/Environmental Education,  
Glassboro State College,  
1970  
BS/Biology, Lenoir-Rhyne  
College, 1965

**Years of Experience**

With ARCADIS Since 2001

**Professional Registrations**

Ecological Society of America,  
Senior Ecologist  
Society of Wetland Scientists-  
Professional Wetland  
Scientist

**Professional Qualifications**

- Association of State  
Wetland Managers
- Ecological Society of  
America
- Estuarine Research  
Federation
- New Jersey Wildlife Society
- Society of Ecological  
Restoration
- Society of Wetland  
Scientists
- The Wildlife Society

**Advisory Boards**

- Public Service Electric and  
Gas, Estuarine  
Enhancement Management  
Plan Advisory Committee
- American Wetland  
Research Foundation, Inc.

## Joseph K. Shisler, PhD, PWS, CSE

### Principal Scientist

A nationally recognized wetlands expert, Dr. Shisler has more than 35 years of experience conducting wetland evaluations and restoration projects. He was former president of Shisler Environmental Consultants, Inc. in Little Egg Harbor, New Jersey. Before that he was at Rutgers University for more than 15 years, where he directed research on wetlands, wildlife use, stormwater management, wetland mitigation, and coastal zone management issues. Dr. Shisler has been a consultant to various state, federal, and international agencies concerning wetlands and stormwater management issues, and he has published more than 125 papers on the subject. Dr. Shisler's work was recognized by the New Jersey Wildlife Society, which presented him with the 1980 Conservationist of the Year award. Dr. Shisler evaluated the wetlands on Staten Island for the New York Department of Environmental Conservation. Governor Kean appointed him chairperson of the New Jersey Wetlands Mitigation Council in 1989. Dr. Shisler is a professional wetland scientist certified by the Society of Wetland Scientists and a senior ecologist certified by the Ecological Society of America.

**Experience****Environmental Consultant for Superfund Sites**

Various Locations in U.S.

Environmental consultant on a number of Superfund sites throughout the United States to address wetland, wildlife, and natural resource damages. Interacted with agencies to obtain necessary permits and meet cleanup requirements that have included wetland delineation, wetland mitigation plans and successful implementation, and habitat and wildlife surveys.

**Evaluation of Sites**

New Jersey and Surrounding States

Evaluated more than 2,500 sites as potential wetland sites and their environmental impacts for a number of engineering firms. Assisted in obtaining the necessary permits required under the state and federal agencies.

#### **Wetland Management Methods**

While at Rutgers University, served as a consultant to New Jersey to address wetland management methods associated with mosquito control. Under his direction, the open marsh water management and tidal restoration of impoundments have become major methods in the restoration of coastal wetland ecosystems.

#### **Expert Witness**

Has been qualified in several courts as an expert witness in various environmental fields including wetland delineations and management, wildlife management, ecology, stormwater management issues, environmental impact assessments, and pest management. Has been accepted as an expert in more than 100 municipal and county planning boards and environmental commissions in New Jersey, Pennsylvania, and New York.

#### **Faculty Member**

Rutgers University, University of South Carolina, and Trenton State College  
Served as a faculty member at Rutgers University in the Department of Entomology and Economic Zoology and as an adjunct faculty member at the University of South Carolina and Trenton State College.

#### **Participant in Short Courses**

Has been an invited participant in a number of short courses for professionals for the USEPA; the Office of Continuing Professional Education, Cook College - Rutgers University; The National Wetland Science Training Cooperative, Seattle, Washington; and Executive Enterprises, Washington, D.C. Was instrumental in developing the short course series on wetlands and coastal issues at Cook College. Has been invited participant in wetland mitigation, mosquito and vector control, dredge disposal issues, wildlife management, coastal zone development, and floodplain and stormwater management workshops (list available on request).

#### **Overseas Consultant for Antimalarial Project**

Overseas consultant to the U.S. Department of State - Agency for International Development antimalarial project in Zaire to address habitat management procedures in the control of vectors. Invited participant and chairperson of the Water and Weed Management, and Source Reduction Section for the Workshop "Comprehensive Vector Control - Current Status and Research Needs" of the World Health Organization.

#### **Evaluation of Mosquito Control Program**

Evaluated the development of a comprehensive mosquito control program for Cape Cod National Park for the U.S. Department of Interior-Park Service.

#### **Consultant on Wetlands Mitigation**

Consultant to the USEPA on wetlands mitigation in the northeastern United States. Problem species associated with wetland mitigation.

#### **Management for Vector Control**

International Irrigation Management Institute Kandy, Sri Lanka-Environmental management for vector control.

#### **Consultant for Possible Lyme Disease Vectors**

Mammal trapping and habitat identification consultant for possible Lyme disease vectors in New Jersey for the New Jersey Department of Health.

#### **Publications**

Dr. Shisler has published more than 100 scientific papers in various periodicals and presented more than 200 scientific papers at various state, national, and international meetings (list available on request). Papers have been published in following journals:

*American Midland Naturalist*  
*Biological Conservation*  
*Bulletin of New Jersey Academy of Science*  
*Bulletin of the Ecological Society of America*  
*Condor*  
*Estuaries*  
*Ibis*  
*J. of American Mosquito Control Association*  
*J. of Medical Entomology*  
*Marine Biology*  
*Proc. of the Coastal Society*  
*Proc. of Colonial Waterbird Group*  
*Proc. of New Jersey Mosquito Control Association*  
*Proc. of NE Fish and Wildlife*  
*Science*  
*Transactions of the American Fisheries Society*  
*Wetlands*  
*Wilson's Bulletin*  
*Yale J. Biology and Medicine*



# ARCADIS

## Education

MS, Plant Ecology, University of  
Michigan, 2000  
BA, Biology and Philosophy,  
Kenyon College, 1997

## Years of Experience

With ARCADIS Since 2004

## Douglas Partridge, MS Project Ecologist

Mr. Partridge's 8 years of professional experience ranges from the development, implementation, and monitoring of ecosystem restoration projects and conservation strategies for protected plant and animal species, to development and application of functional assessment models, to routine wetland delineations and environmental permit assistance.

Responsibilities across this range of projects have included, but were not limited to, project management, ecosystem restoration design, special-status species surveys, development of conservation strategies, habitat assessments, watershed planning, compliance monitoring of restoration projects, wetland delineations, construction oversight, management strategies for noxious weeds, literature reviews, data base management, statistical analysis, environmental permit acquisition, grant writing, and production of technical reports.

## Experience

### North Creek Riparian Ecosystem Restoration Project

University of Washington, Bothell/Cascadia Community College, Bothell, Washington  
Assisted with mitigation design, permitting, construction supervision, endangered species issues, oversight of native plant nursery, and long-term management and compliance monitoring for 58-acre stream and floodplain ecosystem restoration project along North Creek. Overseeing long-term maintenance activities and compliance monitoring. Also prepared a functional assessment in Year 4 of compliance monitoring to assist with application of "excess" mitigation credit to development project occurring on the campus property.

### Conceptual Mitigation Plan

City of Bothell, Bothell, Washington  
Preparation of a conceptual mitigation approach on a city owned property to support future planning associated with mitigating unavoidable impacts to waters/wetlands that may result from current and future capital improvement projects.

**Newskah Creek Riparian Ecosystem Restoration Project**

Washington Department of Corrections, Aberdeen, Washington

Overseeing long-term management and compliance monitoring of 10-acre tidally-influenced stream ecosystem restoration project adjacent to Grays Harbor. Newkah Creek is a salmonid producing stream, primarily supporting Chinook (*Oncorhynchus tshawytscha*) and Coho (*O. kisutch*) salmon.

**Wetland Conceptual Design Report**

Confidential Client, Ravensdale, Washington

Prepared a conceptual design report that would construct wetlands to assist with managing leachate seeps on an existing mining property.

**Stream Restoration Design**

City of Santa Barbara, Santa Barbara, California

Assisted with the preparation of an ecosystem restoration design for a tributary of El Estero channel. Restoration design was focused on restoring habitat for the southwestern pond turtle (*Emys marmorata*).

**Biological Species and Habitat Survey and Restoration Plan**

Confidential Client, Casmalia, California

Preparation of a Biological Species and Habitat Report intended to synthesize results of previously conducted field surveys focused on determining the presence or absence of 39 known or potentially occurring sensitive species within or proximate to the site. Work culminated in the restoration design of wetland habitat to support the California red-legged frog (*Rana aurora draytonii*).

**Conceptual Approach to Benthic Habitat Restoration**

Confidential Client, Hastings-on-Hudson, New York

Preparation of a conceptual design strategy to restore benthic habitat in the Hudson River following proposed dredging and capping activities within the village of Hastings-on-Hudson. The project goal was to enhance the cap surface to promote rapid re-colonization by a diverse and abundant benthic community.

**San Pedro Creek Flood Control, Restoration, and Fish Habitat Projects**

City of Pacifica, Pacifica, California

Assisted with environmental planning and permitting, grant procurement, restoration design, endangered species issues including fish passage, construction observation, and compliance monitoring for two projects along San Pedro Creek. Endangered species included the California red legged frog (*Rana aurora draytonii*) and Central California Coast Steelhead (*Oncorhynchus mykiss*).

**Calera Creek Ecosystem Restoration Projects**

City of Pacifica, Pacifica, California

Assisted with environmental planning and permitting, restoration design, and endangered species issues specific to three restoration projects along Calera Creek. Endangered species included the California red legged frog (*Rana aurora draytonii*) and the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*).

**Wetland Ecosystem Project**

Shell Oil Company, Anacortes, Washington

Assisted in long-term management and monitoring of 16-acre wetland ecosystem project adjacent to Padilla Bay, a national estuarine reserve.

**Rare Plant Survey**

Confidential Client, North Adams, Massachusetts

Conducted rare plant survey for special status sedge species to assist with site planning and permitting.

**Rare Plant Survey and Monitoring**

Napa County Flood Control and Water Conservation District, Napa County, California

Conducted rare plant survey in the lower Napa River ecosystem for the Napa River/Napa Creek flood control project. Produced technical report including geographic distribution of special-status plant species within project area, mitigation strategy for proposed impacts, and recommended monitoring protocols.

**Suisun Thistle Survey**

Solano County Water Agency, Solano County, California

Conducted survey for the federally endangered Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*) in the upper Suisun Marsh of Rush Ranch. Produced technical report including geographic distribution of endangered thistle on Rush Ranch, estimates of size/age class distribution, identified threats to thistle viability, and recommended management techniques to address long-term sustainability of the thistle on Rush Ranch.

**Franciscan Thistle Survey**

Golden Gate National Recreation Area, San Francisco, California

Conducted survey of state-protected Franciscan thistle (*Cirsium andrewsii*) in the Presidio National Park and Marin Headlands within San Francisco Bay area. Produced technical report including geographic distribution of the species and recommended monitoring protocols.

**Rare Plant Surveys, Waters/Wetlands Delineation, Ecosystem Restoration**

Confidential Client, San Jose, California

Conducted surveys for rare plant species across a 5,000 acre site to support decommission, demolition, and remediation activities. Site surveys occur across a range of plant communities including chaparral, scrub-shrub, serpentine grasslands, exotic grasslands, and riparian and oak woodland. Work also includes delineation of waters/wetlands over approximately 3,500 acres of the site to assist site planning and permitting. Current activities focus on preparation of stream and wetland ecosystem restoration designs.

**Waters/Wetlands Delineation and Stormwater Management Planning**

California Department of Parks and Recreation, Sacramento, California

Delineate waters/wetlands over approximately 1000 acres, and preparation of planning documents to control sediment and erosion control as well as stormwater within an off-road vehicle park.

**Waters/Wetlands Delineation and Site Wide Planning**

Confidential Client, Carteret, New Jersey

Delineate waters/wetlands on 104 acre property, and assist client with site wide planning and permitting.

**Waters/Wetlands Delineation and Biological Assessment**

San Francisco Public Utilities Commission, San Francisco, California

Delineate waters/wetlands, and prepare biological assessment to assist with planning and permitting associated with a new treated water reservoir development project.

**Waters/Wetlands Delineation, Stormwater Outfall Design and Permitting**

Confidential Client, Marietta, Ohio

Delineate waters/wetlands, acquire permits for construction of stormwater outfall to Duck Creek, design and install log jams to stabilize soil and channel bank at outfall.

**Waters/Wetlands Delineation and Mitigation Plan**

Confidential Client, Westport, Oregon

Delineate waters/wetlands, prepare mitigation plan for temporary impacts to waters/wetlands, and oversee plant installation.

**HGM Guidebook Development**

California Regional Water Quality Control Board (RWQCB), California

Development of the Guidebook to Hydrogeomorphic Functional Assessment of Riverine Waters/Wetlands in the Santa Margarita Watershed. Project completed in cooperation with USEPA Region IX, the California Coastal Conservancy, and the California RWQCB.

### **HGM Guidebook Development**

Santa Barbara County Water Agency, Santa Barbara County, California  
Development and training of the Draft Guidebook for Referenced Based Assessment of the Functions of Riverine Waters/Wetlands Ecosystems in the South Coast Region. Project completed in cooperation with Santa Barbara Water Agency and U.S. Environmental Protection Agency (USEPA) Region IX.

### **Selected Publications**

Peggy L. Fiedler, Megan Keever, Brenda J. Grewell, and Douglas J. Partridge. 2007. Rare Plants in the Golden Gate Estuary (California): The Relationship between Scale and Understanding. Australian Journal of Botany.

Partridge, D., and L. C. Lee. 2005. Application of the hydrogeomorphic approach to restoration, monitoring, and adaptive management to the lower North Creek ecosystem, Bothell, Washington. Presentation at Association of State Wetland Managers conference on Integrated Restoration of Riverine Wetlands, Streams, Riparian Areas, and Floodplains in Watershed Context. Amherst, Massachusetts. November 2005.

Partridge, D., P.L. Fiedler, and M. Keever. 2003. "Monitoring of a Metapopulation, *Lilaeopsis masonii*, in the Lower Napa River Ecosystem." Poster presented at the State of the Estuary Conference, September.

Keever, M., P.L. Fiedler, and D. Partridge. 2003. "Geographic Distribution and Population Parameters of the Endangered Suisun Thistle (*Cirsium hydrophilum* var. *hydrophilum*) at Rush Ranch." Poster presented at the State of the Estuary Conference, September.

Partridge, D. 2001. "Remote Functional Assessment Protocol for Riverine Ecosystems in the South Coast Region of Santa Barbara County, California." Presentation at the Society of Wetland Scientists, May, Chicago, Illinois.

Appendix D

Sample Plot Data Sheets

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
 (1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTERET, NJ</u> Applicant/Owner: <u>CTEC</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>						
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	<table style="width: 100%;"> <tr> <td style="text-align: center;">Yes <input checked="" type="radio"/> No <input type="radio"/></td> <td style="vertical-align: top;">Community ID: <u>UPLAND</u></td> </tr> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input checked="" type="radio"/></td> <td style="vertical-align: top;">Transect ID: <u>#1</u></td> </tr> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input checked="" type="radio"/></td> <td style="vertical-align: top;">Plot ID: <u>#1</u></td> </tr> </table>	Yes <input checked="" type="radio"/> No <input type="radio"/>	Community ID: <u>UPLAND</u>	Yes <input type="radio"/> No <input checked="" type="radio"/>	Transect ID: <u>#1</u>	Yes <input type="radio"/> No <input checked="" type="radio"/>	Plot ID: <u>#1</u>
Yes <input checked="" type="radio"/> No <input type="radio"/>	Community ID: <u>UPLAND</u>						
Yes <input type="radio"/> No <input checked="" type="radio"/>	Transect ID: <u>#1</u>						
Yes <input type="radio"/> No <input checked="" type="radio"/>	Plot ID: <u>#1</u>						

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Phragmites australis</u> (63)	<u>H</u>	<u>FACW</u>	9. _____	_____	_____
2. <u>Distichlis spicata</u> (38)	<u>H</u>	<u>FACW+</u>	10. _____	_____	_____
3. <u>Juncus tenuis</u> (10)	<u>H</u>	<u>FAC-</u>	11. _____	_____	_____
4. <u>Solidago sempervirens</u> (38)	<u>H</u>	<u>FACW</u>	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. <u>Baccharis halimifolia</u> (5)	<u>S</u>	<u>FACW</u>	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 80%

Remarks: HYDROPHYTIC VEGETATION CRITERIA MET  
DISTURBED VEG. PROXIMATE TO SITE ACCESS RD.

**HYDROLOGY**

<p>___ Recorded Data (Describe in Remarks):          ___ Stream, Lake, or Tide Gauge          ___ Aerial Photographs          ___ Other  <input checked="" type="checkbox"/> No Recorded Data Available</p> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p>___ Inundated</p> <p>___ Saturated in Upper 12 Inches</p> <p>___ Water Marks</p> <p>___ Drift Lines</p> <p>___ Sediment Deposits</p> <p>___ Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p>___ Oxidized Root Channels in Upper 12 Inches</p> <p>___ Water-Stained Leaves</p> <p>___ Local Soil Survey Data</p> <p>___ FAC-Neutral Test</p> <p>___ Other (Explain in Remarks)</p>
Remarks: <u>No 1° or 2° Hydro. Characteristics</u>	

## SOILS

Map Unit Name  
(Series and Phase): IMPOUNDMENT FILL

Taxonomy (Subgroup): \_\_\_\_\_

Drainage Class: \_\_\_\_\_  
Field Observations  
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12"	A	25YR 3/4	NONE	NONE	

Hydric Soil Indicators:

<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

Remarks: FILL PROXIMATE TO SITE ACCESS ROAD.  
(SINGLE HORIZON (A) IN TOP 12")

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes <input type="radio"/> No (Circle) Wetland Hydrology Present? <input checked="" type="radio"/> Yes <input type="radio"/> No Hydric Soils Present? <input checked="" type="radio"/> Yes <input type="radio"/> No	(Circle) Is this Sampling Point Within a Wetland? <input checked="" type="radio"/> Yes <input type="radio"/> No
Remarks: UPLAND CONDITION. NO HYDROLOGY + SOILS CHARACTERIZED AS ROAD FILL  (PROXIMATE TO B5)	

Approved by HQUSACE 3/92



**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
 (1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTERET, NJ</u> Applicant/Owner: <u>CITEC</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>		
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	<table style="width: 100%;"> <tr> <td style="text-align: center;"> <input checked="" type="radio"/> Yes   <input type="radio"/> No  <input type="radio"/> Yes   <input checked="" type="radio"/> No  <input type="radio"/> Yes   <input checked="" type="radio"/> No         </td> <td style="vertical-align: top;">           Community ID: <u>WETLAND</u>            Transect ID: <u>(LOOP B)</u>            Plot ID: <u>#2</u> </td> </tr> </table>	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Yes <input checked="" type="radio"/> No	Community ID: <u>WETLAND</u> Transect ID: <u>(LOOP B)</u> Plot ID: <u>#2</u>
<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Yes <input checked="" type="radio"/> No	Community ID: <u>WETLAND</u> Transect ID: <u>(LOOP B)</u> Plot ID: <u>#2</u>		

TRAN #1

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Phragmites australis (63)</u>	<u>H</u>	<u>FACW</u>	9. _____	_____	_____
2. <u>Spartina alterniflora (8)</u>	<u>H</u>	<u>OBL</u>	10. _____	_____	_____
3. <u>Spartina cynosuroides (20.5)</u>	<u>H</u>	<u>OBL</u>	11. _____	_____	_____
4. <u>Spartina patens (20.5)</u>	<u>H</u>	<u>FACW+</u>	12. _____	_____	_____
5. <u>Distichlis spicata (10.5)</u>	<u>H</u>	<u>FACW+</u>	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks: HYDROPHETIC VEGETATION!

**HYDROLOGY**

<p>Recorded Data (Describe in Remarks):</p> <p> <input type="checkbox"/> Stream, Lake, or Tide Gauge  <input type="checkbox"/> Aerial Photographs  <input type="checkbox"/> Other  <input checked="" type="checkbox"/> No Recorded Data Available         </p> <hr/> <p>Field Observations: <u>WATER TO SURFACE</u></p> <p>Depth of Surface Water: <u>0"</u> (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p><b>Wetland Hydrology Indicators:</b></p> <p><b>Primary Indicators:</b></p> <p> <input checked="" type="checkbox"/> Inundated  <input checked="" type="checkbox"/> Saturated in Upper 12 Inches  <input checked="" type="checkbox"/> Water Marks  <input checked="" type="checkbox"/> Drift Lines  <input type="checkbox"/> Sediment Deposits  <input checked="" type="checkbox"/> Drainage Patterns in Wetlands         </p> <p><b>Secondary Indicators (2 or more required):</b></p> <p> <input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 Inches  <input type="checkbox"/> Water-Stained Leaves  <input type="checkbox"/> Local Soil Survey Data  <input type="checkbox"/> FAC-Neutral Test  <input type="checkbox"/> Other (Explain in Remarks)         </p>
Remarks:	

# SOILS

Map Unit Name (Series and Phase): <u>Transquaky Mucky PEAT</u>		Drainage Class: _____	
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type? Yes No	

Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12"	O	10 YR 3/2	—	—	Mucky PEAT.

Hydric Soil Indicators:	
<input checked="" type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input checked="" type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input checked="" type="checkbox"/> Reducing Conditions <input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input checked="" type="checkbox"/> Listed on Local Hydric Soils List - <u>check</u> <input checked="" type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks: NO ZONATION, SOLE FOR SMELL, HISTOSOL - MUCKY ORGANIC PEAT.  
NO VEG DECOMPOSITION IN UPPER PORTION OF PROFILE

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes <input type="radio"/> No (Circle) Wetland Hydrology Present? <input checked="" type="radio"/> Yes <input type="radio"/> No Hydric Soils Present? <input checked="" type="radio"/> Yes <input type="radio"/> No	Is this Sampling Point Within a Wetland? <input checked="" type="radio"/> Yes <input type="radio"/> No (Circle)
Remarks: <u>WETLAND CRITERIA MET.</u>	

Approved by HQUSACE 3/92

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CALTEX NJ</u> Applicant/Owner: <u>CPTC</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>WETLAND</u> Transect ID: <u>2</u> Plot ID: <u>3</u>

10 feet from Flag A21

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Spartina cynosuroides (38)</u>	<u>H</u>	<u>OBL</u>	9. _____	_____	_____
2. <u>Spartina alterniflora (63)</u>	<u>H</u>	<u>OBL</u>	10. _____	_____	_____
3. <u>Amplexipetala (10)</u>	<u>H</u>	<u>FACW</u>	11. _____	_____	_____
4. <u>Spartina patens (38)</u>	<u>H</u>	<u>FACW+</u>	12. _____	_____	_____
5. <u>Distichlis spicata (10.5)</u>	<u>H</u>	<u>FACW+</u>	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100 %

Remarks: Hydrophytic vegetation

**HYDROLOGY**

<p>___ Recorded Data (Describe in Remarks):          ___ Stream, Lake, or Tide Gauge          ___ Aerial Photographs          ___ Other  <input checked="" type="checkbox"/> No Recorded Data Available</p> <p>Field Observations:</p> <p>Depth of Surface Water: <u>0</u> (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p><b>Wetland Hydrology Indicators:</b></p> <p><b>Primary Indicators:</b></p> <p><input checked="" type="checkbox"/> Inundated</p> <p><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input checked="" type="checkbox"/> Water Marks</p> <p><input checked="" type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input checked="" type="checkbox"/> Drainage Patterns in Wetlands</p> <p><b>Secondary Indicators (2 or more required):</b></p> <p><input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
Remarks: _____	

Map Unit Name (Series and Phase): TRANSQUARY MUCKY PEAT Drainage Class: \_\_\_\_\_  
Field Observations \_\_\_\_\_  
Taxonomy (Subgroup): \_\_\_\_\_ Confirm Mepped Type? Yes No

**Profile Description:**

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-7 1/2"	O	10 YR 3/2			

**Hydric Soil Indicators:**

<input checked="" type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input checked="" type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input checked="" type="checkbox"/> Listed on Local Hydric Soils List
<input checked="" type="checkbox"/> Reducing Conditions	<input checked="" type="checkbox"/> Listed on National Hydric Soils List
<input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

Remarks: HISTOSOL. MUCKY ORGANIC PEAT ≥ 12" DEEP.  
HYDRIC SOIL.

Hydrophytic Vegetation Present?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	(Circle)
Wetland Hydrology Present?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	(Circle)
Hydric Soils Present?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	(Circle)
Is this Sampling Point Within a Wetland?			<input checked="" type="radio"/> Yes <input type="radio"/> No
Remarks: WETLAND CRITERIA MET.			

Approved by HQUSACE 3/92

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTERET, NJ</u> Applicant/Owner: <u>CPREC</u> Investigator: <u>QJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>UPLAND</u> Transect ID: <u>2</u> Plot ID: <u>4</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Solidago sempervirens</u>	<u>H</u>	<u>FACW</u>	9. _____	_____	_____
2. <u>Aster subulatus</u>	<u>H</u>	<u>OBL</u>	10. _____	_____	_____
3. <u>Phragmites australis</u>	<u>H</u>	<u>FACW</u>	11. _____	_____	_____
4. <u>Dactylis spicata</u>	<u>H</u>	<u>FACW</u> +	12. _____	_____	_____
5. <u>Iva frutescens</u>	<u>S</u>	<u>FACW</u> +	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks: Other plant associates - Wormwood (Artemisia annua) (0.5) + 3" Fox-tail sp (Alopecurus sp.) (0.5)

**HYDROLOGY**

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations: <u>DRY</u></p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p><b>Wetland Hydrology Indicators:</b></p> <p><b>Primary Indicators:</b></p> <p><input type="checkbox"/> Inundated</p> <p><input type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input type="checkbox"/> Water Marks</p> <p><input type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input type="checkbox"/> Drainage Patterns in Wetlands</p> <p><b>Secondary Indicators (2 or more required):</b></p> <p><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
Remarks: <u>DRY FILL ON UPLAND SITE OF BERM/ROAD</u>	

Map Unit Name (Series and Phase): <u>IMPOUNDMENT FILL</u>		Drainage Class: _____	
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type?    Yes    No	

Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6"	A	10YR 3/3			
6-12"	B	2.5YR 4/6			

Hydric Soil Indicators:	
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks: <u>SOIL PLOT TAKEN IN IMPOUNDMENT CAP.</u> <u>NOT HYDRIC SOILS, NO REDUCING CONDITIONS IN MINERAL FILL.</u>
---

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes <input checked="" type="radio"/> No <input type="radio"/> (Circle)	Is this Sampling Point Within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> (Circle)
Wetland Hydrology Present?	Yes <input type="radio"/> No <input checked="" type="radio"/> (Circle)	
Hydric Soils Present?	Yes <input type="radio"/> No <input checked="" type="radio"/> (Circle)	
Remarks: SAMPLE PLOT TAKEN IN IMPROVEMENT W/IN FACILITY - NORTH SIDE OF ROAD. NOT A WETLAND. DOES NOT MEET CRITERIA FOR WETLAND HYDROLOGY + HYDRIC SOILS.		

Approved by HQUSACE 3/92

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
 (1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTONET</u> Applicant/Owner: <u>OPTER</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>WETLAND</u> Transect ID: <u>3</u> Plot ID: <u>5</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Spartina patens</u>	<u>H</u>	<u>FACW+</u>	9. _____	_____	_____
2. <u>Spartina alterniflora</u>	<u>H</u>	<u>OBL</u>	10. _____	_____	_____
3. <u>Distichlis spicata</u>	<u>H</u>	<u>FACW+</u>	11. _____	_____	_____
4. <u>Phragmites australis</u>	<u>H</u>	<u>FACW</u>	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Hydrophytic Vegetation.

**HYDROLOGY**

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: <u>2</u> (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input checked="" type="checkbox"/> Inundated</p> <p><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input checked="" type="checkbox"/> Water Marks</p> <p><input checked="" type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
<p>Remarks: <u>WETLANDS Hydrology</u></p>	

Map Unit Name  
(Series and Phase): TRANSQUARY Mucky Bog Drainage Class: \_\_\_\_\_  
Field Observations \_\_\_\_\_  
Taxonomy (Subgroup): \_\_\_\_\_ Confirm Mapped Type? Yes No

**Profile Description:**

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2 1/2"		Gley 14/N	✓	✓	

**Hydric Soil Indicators:**

<input checked="" type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input checked="" type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input checked="" type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input checked="" type="checkbox"/> Listed on National Hydric Soils List
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

**Remarks:** Deep organic mucky soil. No decomposition of roots/organic in upper 2". Meets hydric soil criteria as a histosol w/ signif. sulfidic odor

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes No (Circle) Wetland Hydrology Present? <input checked="" type="radio"/> Yes No Hydric Soils Present? <input checked="" type="radio"/> Yes No	(Circle) Is this Sampling Point Within a Wetland? <input checked="" type="radio"/> Yes No
Remarks: WETLAND CRITERIA MET.	

Approved by HQUSACE 3/92



DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTER</u> Applicant/Owner: <u>CYTEC</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>UPLAND</u> Transect ID: <u>3</u> Plot ID: <u>6</u>

Proximate to wetland flag A45 (10' S)

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Phragmites australis</u> (63)	<u>H</u>	<u>FACW</u>	9. _____	_____	_____
2. <u>Grassum arvense</u> (65)	<u>H</u>	<u>FACU</u>	10. _____	_____	_____
3. <u>Baccharis halimifolia</u> (60)	<u>S</u>	<u>FACW</u>	11. _____	_____	_____
4. <u>Toxicodendron radicans</u> (38)	<u>SV</u>	<u>FAC</u>	12. _____	_____	_____
5. <u>Rosa multiflora</u> (3)	<u>S</u>	<u>FACU</u>	13. _____	_____	_____
6. <u>Prunus serotina</u> (30)	<u>T</u>	<u>FACU</u>	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks: \_\_\_\_\_

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"> <input type="checkbox"/> Stream, Lake, or Tide Gauge  <input type="checkbox"/> Aerial Photographs  <input type="checkbox"/> Other         </p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p style="margin-left: 20px;"> <input type="checkbox"/> Inundated  <input type="checkbox"/> Saturated in Upper 12 Inches  <input type="checkbox"/> Water Marks  <input type="checkbox"/> Drift Lines  <input type="checkbox"/> Sediment Deposits  <input type="checkbox"/> Drainage Patterns in Wetlands         </p> <p>Secondary Indicators (2 or more required):</p> <p style="margin-left: 20px;"> <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches  <input type="checkbox"/> Water-Stained Leaves  <input type="checkbox"/> Local Soil Survey Data  <input type="checkbox"/> FAC-Neutral Test  <input type="checkbox"/> Other (Explain in Remarks)         </p>
<p>Remarks: <u>Do 1" or 2" indicators. Located on a berm upgradient of salt marsh.</u></p>	

Map Unit Name (Series and Phase):		<u>Fill - berm/impoundment</u>		Drainage Class:	
Taxonomy (Subgroup):				Field Observations	
				Confirm Mapped Type?	Yes No

Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 - 0.5	O	7.5YR 3/4			
0.5 - 4	A	10R 4/6			Clay
4 - >12"		Mixed fill.	Matrix color	w/ signif. blue hues	mixed, clay

Hydric Soil Indicators:	
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks:	Soil plot in significant fill. Upper layers solid red clay. Below 4" mixed fill.
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Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes <input type="radio"/> No (Circle) Wetland Hydrology Present? <input checked="" type="radio"/> Yes <input type="radio"/> No Hydric Soils Present? <input checked="" type="radio"/> Yes <input type="radio"/> No	(Circle) Is this Sampling Point Within a Wetland? <input checked="" type="radio"/> Yes <input type="radio"/> No
Remarks: Wetland criteria not met.	

Approved by HQUSACE 3/92

DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTER</u> Applicant/Owner: <u>CITEC</u> Investigator: _____	Date: <u>12/12/67</u> County: <u>Middlesex</u> State: <u>MI</u>
Do Normal Circumstances exist on the site? <span style="margin-left: 20px;"><input checked="" type="radio"/> Yes <input type="radio"/> No</span> Is the site significantly disturbed (Atypical Situation)? <span style="margin-left: 20px;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> Is the area a potential Problem Area? <span style="margin-left: 20px;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> (If needed, explain on reverse.)	Community ID: <u>UPLAND</u> Transect ID: <u>4</u> Plot ID: <u>7</u>

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Alnus altissima</u>	<u>T</u>	<u>NI</u>	9. _____	_____	_____
2. <u>Celastrus orbiculatus</u>	<u>SV</u>	<u>UPL</u>	10. _____	_____	_____
3. <u>Lonicera japonica</u>	<u>SV</u>	<u>FAC</u>	11. _____	_____	_____
4. <u>Phragmites australis</u>	<u>H</u>	<u>FACW</u>	12. _____	_____	_____
5. <u>Solidago sempervirens</u>	<u>H</u>	<u>FACW</u>	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). < 50%

Remarks: Not hydrophilic vegetation

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input type="checkbox"/> Inundated</p> <p><input type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input type="checkbox"/> Water Marks</p> <p><input type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
Remarks: <u>No 1<sup>st</sup> or 2<sup>nd</sup> Indicators</u>	

Map Unit Name (Series and Phase): <u>Fill</u>		Drainage Class: _____	
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type? Yes No	

Profile Description:			
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)
0-0.5	A	10YR 2/2	
0-5	A1	7.5YR 3/4	
5-12	A2	10YR 5/6	

Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:	
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks: <u>No hydric soils</u>
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Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No (Circle) Wetland Hydrology Present? Yes <input checked="" type="radio"/> No (Circle) Hydric Soils Present? Yes <input checked="" type="radio"/> No (Circle)	Is this Sampling Point Within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> (Circle)
Remarks: <u>Uplands</u>	

Approved by HQUSACE 3/92

DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTERET</u> Applicant/Owner: <u>CTEC</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>Wetland</u> Transect ID: <u>4</u> Plot ID: <u>8</u>

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Spartina alterniflora</u>	<u>1+</u>	<u>OBL</u>	9. _____	_____	_____
2. <u>Spartina patens</u>	<u>11</u>	<u>FACW+</u>	10. _____	_____	_____
3. _____	_____	_____	11. _____	_____	_____
4. _____	_____	_____	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: HYDROPHYTIC VEGETATION - SALT MARSH!

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations: <u>SATURATED TO SURFACE</u></p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: <u>0</u> (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Inundated</li> <li><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</li> <li><input type="checkbox"/> Water Marks</li> <li><input type="checkbox"/> Drift Lines</li> <li><input type="checkbox"/> Sediment Deposits</li> <li><input type="checkbox"/> Drainage Patterns in Wetlands</li> </ul> <p>Secondary Indicators (2 or more required):</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</li> <li><input type="checkbox"/> Water-Stained Leaves</li> <li><input type="checkbox"/> Local Soil Survey Data</li> <li><input type="checkbox"/> FAC-Neutral Test</li> <li><input type="checkbox"/> Other (Explain in Remarks)</li> </ul>
Remarks: <u>WETLAND HYDROLOGY</u>	

# SOILS

Map Unit Name (Series and Phase):		TRANSQUARY Mucky peat		Drainage Class:	
Taxonomy (Subgroup):				Field Observations	
				Confirm Mapped Type?	Yes No

Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10 YR 3/3			
3-12"	B	Gly 3/5B (3/1)			Silty organic

Hydric Soil Indicators:	
<input checked="" type="checkbox"/> Histosol <input checked="" type="checkbox"/> Histic Epipedon <input checked="" type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input checked="" type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks:	characteristic of mucky peat. However, blue hues. Minimal to no breakdown of organic material in upper 9" HYDRIC SOILS BY DEF of HISTOSOL + SULFIDIC ODR
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## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <span style="margin-left: 20px;">Yes No (Circle)</span> Wetland Hydrology Present? <span style="margin-left: 20px;">Yes No</span> Hydric Soils Present? <span style="margin-left: 20px;">Yes No</span>	(Circle) Is this Sampling Point Within a Wetland? <span style="margin-left: 20px;">Yes No</span>
Remarks: WETLAND CRITERIA MET	

Approved by HQUSACE 3/92

DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTONET</u> Applicant/Owner: <u>OPTEC</u> Investigator: <u>DJP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>UPLAND</u> Transect ID: <u>5</u> Plot ID: <u>9</u>

25' from A92

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Robinia pseudacacia</u>	<u>T</u>	<u>FACU</u>	9. _____	_____	_____
2. <u>Baccharis halimifolia</u>	<u>S</u>	<u>FACW</u>	10. _____	_____	_____
3. <u>Ageratina altissima</u>	<u>H</u>	<u>FACU</u>	11. _____	_____	_____
4. <u>Teslca sp.</u>	<u>H</u>	_____	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): \_\_\_\_\_

Remarks: Not hydrophytic vegetation

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: _____ (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input type="checkbox"/> Inundated</p> <p><input type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input type="checkbox"/> Water Marks</p> <p><input type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
Remarks: <u>No 1° or 2° indicators</u>	

Map Unit Name  
(Series and Phase):

Taxonomy (Subgroup):

Drainage Class:

Field Observations

Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12"	A	10YR 3/6	FILL <sup>s</sup>		Clay

Hydric Soil Indicators:

<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

Remarks:

Hydrophytic Vegetation Present? Yes <u>No</u> (Circle) Wetland Hydrology Present? Yes <u>No</u> (Circle) Hydric Soils Present? Yes <u>No</u> (Circle)	Is this Sampling Point Within a Wetland? Yes <u>No</u> (Circle)
Remarks: Upland	

Approved by HQUSACE 3/92



DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTERET</u> Applicant/Owner: <u>CYTEC</u> Investigator: <u>DIP + JKS</u>	Date: <u>12/12/07</u> County: <u>Middlesex</u> State: <u>NJ</u>
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>WETLAND</u> Transect ID: <u>5</u> Plot ID: <u>10</u>

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Iva frutescens</u>	<u>3</u>	<u>FACW+</u>	9. _____	_____	_____
2. <u>Phragmites australis</u>	<u>H</u>	<u>FACW</u>	10. <u>=</u>	_____	_____
3. <u>Spartina alterniflora</u>	<u>H</u>	<u>OBL</u>	11. _____	_____	_____
4. <u>Spartina patens</u>	<u>H</u>	<u>FACW+</u>	12. _____	_____	_____
5. <u>Distichlis spicata</u>	<u>H</u>	<u>FACW+</u>	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks: HYPOPHYTIC VEGETATION SALT MARSH

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"> <input type="checkbox"/> Stream, Lake, or Tide Gauge  <input type="checkbox"/> Aerial Photographs  <input type="checkbox"/> Other         </p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: <u>8</u> (in.)</p> <p>Depth to Saturated Soil: <u>to surface</u> (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input checked="" type="checkbox"/> Inundated</p> <p><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input checked="" type="checkbox"/> Water Marks</p> <p><input checked="" type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
Remarks: <u>WETLAND Hydrology</u>	

Map Unit Name  
(Series and Phase): Transquaky Huxley Peak

Taxonomy (Subgroup): \_\_\_\_\_

Drainage Class: \_\_\_\_\_  
Field Observations \_\_\_\_\_  
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 3/3			
2-12"		Gley 3/5B (3/1)			

Hydric Soil Indicators:

<input checked="" type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input checked="" type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input checked="" type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input checked="" type="checkbox"/> Listed on Local Hydric Soils List
<input checked="" type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

Remarks: HISTOSOL. SULFIDIC. Small. No. Blain down 7 organics in upper profile. Hydric Soil

WETLAND DETERMINATION		
Hydrophytic Vegetation Present?	<u>Yes</u> No (Circle)	Is this Sampling Point Within a Wetland? <u>Yes</u> No (Circle)
Wetland Hydrology Present?	<u>Yes</u> No	
Hydric Soils Present?	<u>Yes</u> No	
Remarks: WETLAND		

Approved by HQUSACE 3/92

DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>CARTERET, NJ</u> Applicant/Owner: <u>CYTEZ</u> Investigator: <u>DJP</u>	Date: <u>1/22/08</u> County: <u>Middlesex</u> State: <u>NJ</u>						
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	<table style="width: 100%;"> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input type="radio"/></td> <td style="vertical-align: top;">Community ID: _____</td> </tr> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input type="radio"/></td> <td style="vertical-align: top;">Transect ID: _____</td> </tr> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input type="radio"/></td> <td style="vertical-align: top;">Plot ID: <u>11</u></td> </tr> </table>	Yes <input type="radio"/> No <input type="radio"/>	Community ID: _____	Yes <input type="radio"/> No <input type="radio"/>	Transect ID: _____	Yes <input type="radio"/> No <input type="radio"/>	Plot ID: <u>11</u>
Yes <input type="radio"/> No <input type="radio"/>	Community ID: _____						
Yes <input type="radio"/> No <input type="radio"/>	Transect ID: _____						
Yes <input type="radio"/> No <input type="radio"/>	Plot ID: <u>11</u>						

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Phragmites australis</u>	<u>H</u>	<u>FACW</u>	9. _____	_____	_____
2. <u>Spartina alterniflora</u>	<u>H</u>	<u>OBL</u>	10. _____	_____	_____
3. <u>Spartina cynosuroides</u>	<u>H</u>	<u>OBL</u>	11. _____	_____	_____
4. _____	_____	_____	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks: Hydrophytic vegetat

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: <u>0</u> (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input type="checkbox"/> Inundated</p> <p><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input checked="" type="checkbox"/> Water Marks</p> <p><input checked="" type="checkbox"/> Drift Lines</p> <p><input checked="" type="checkbox"/> Sediment Deposits</p> <p><input checked="" type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
<p>Remarks: <u>Frozen ground. However, saturated to surface</u>  <u>Proximate to ditch/channel.</u></p>	

Map Unit Name  
(Series and Phase): Townsquare Mudry Kent

Drainage Class: \_\_\_\_\_  
Field Observations \_\_\_\_\_  
Confirm Mapped Type? Yes No

Taxonomy (Subgroup): \_\_\_\_\_

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
1-3	O	10YR 3/2			
3->12"	A	3/5 PB*			

Hydric Soil Indicators:

<input checked="" type="checkbox"/> Histosol	_____ Concretions
<input checked="" type="checkbox"/> Histic Epipedon	_____ High Organic Content in Surface Layer in Sandy Soils
<input checked="" type="checkbox"/> Sulfidic Odor	_____ Organic Streaking in Sandy Soils
____ Aquic Moisture Regime	_____ Listed on Local Hydric Soils List
<input checked="" type="checkbox"/> Reducing Conditions	_____ Listed on National Hydric Soils List
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	_____ Other (Explain in Remarks)

Remarks: \* Gley 1 page.

Hydrophytic Vegetation Present?	Yes No (Circle)	Is this Sampling Point Within a Wetland? (Circle) Yes No
Wetland Hydrology Present?	Yes No	
Hydric Soils Present?	Yes No	
Remarks: Wetland.		

Approved by HQUSACE 3/92

DATA FORM  
ROUTINE WETLAND DETERMINATION  
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Carteret, NJ</u> Applicant/Owner: <u>CTEC</u> Investigator: <u>DJP</u>	Date: <u>1/22/08</u> County: <u>Middlesex</u> State: <u>NJ</u>				
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Yes <input checked="" type="radio"/> No <input type="radio"/></td> <td rowspan="3" style="vertical-align: middle; padding-left: 10px;">           Community ID: _____            Transect ID: _____            Plot ID: <u>12</u> </td> </tr> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input checked="" type="radio"/></td> </tr> <tr> <td style="text-align: center;">Yes <input type="radio"/> No <input checked="" type="radio"/></td> </tr> </table>	Yes <input checked="" type="radio"/> No <input type="radio"/>	Community ID: _____ Transect ID: _____ Plot ID: <u>12</u>	Yes <input type="radio"/> No <input checked="" type="radio"/>	Yes <input type="radio"/> No <input checked="" type="radio"/>
Yes <input checked="" type="radio"/> No <input type="radio"/>	Community ID: _____ Transect ID: _____ Plot ID: <u>12</u>				
Yes <input type="radio"/> No <input checked="" type="radio"/>					
Yes <input type="radio"/> No <input checked="" type="radio"/>					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Phragmites australis</u>	<u>H</u>	<u>FACW</u>	9. _____	_____	_____
2. <u>Spartina alterniflora</u>	<u>H</u>	<u>OBL</u>	10. _____	_____	_____
3. <u>Spartina cynosuroides</u>	<u>H</u>	<u>OBL</u>	11. _____	_____	_____
4. <u>Aster subulatus</u>	<u>H</u>	<u>OBL</u>	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Hydrophytic vegetation

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p style="margin-left: 20px;"><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p style="margin-left: 20px;"><input type="checkbox"/> Aerial Photographs</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p> <hr/> <p>Field Observations:</p> <p>Depth of Surface Water: _____ (in.)</p> <p>Depth to Free Water in Pit: _____ (in.)</p> <p>Depth to Saturated Soil: <u>0</u> (in.)</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Inundated</li> <li><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</li> <li><input checked="" type="checkbox"/> Water Marks</li> <li><input checked="" type="checkbox"/> Drift Lines</li> <li><input checked="" type="checkbox"/> Sediment Deposits</li> <li><input checked="" type="checkbox"/> Drainage Patterns in Wetlands</li> </ul> <p>Secondary Indicators (2 or more required):</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</li> <li><input type="checkbox"/> Water-Stained Leaves</li> <li><input type="checkbox"/> Local Soil Survey Data</li> <li><input type="checkbox"/> FAC-Neutral Test</li> <li><input type="checkbox"/> Other (Explain in Remarks)</li> </ul>
<p>Remarks: <u>Frozen ground. Saturated to surface.</u> <u>Proximity to open channel</u></p>	

Map Unit Name (Series and Phase):		Transquachy. mucky peat		Drainage Class:	
Taxonomy (Subgroup):				Field Observations	
				Confirm Mapped Type?	Yes No

Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	O	10 YR 3/3			
1-2 1/2"	A	4/N			

Hydric Soil Indicators:	
<input checked="" type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input checked="" type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input checked="" type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks:	Histosol - mucky peat. Hydric soil.
----------	--

Hydrophytic Vegetation Present?	Yes No (Circle)	Is this Sampling Point Within a Wetland? (Circle) Yes No
Wetland Hydrology Present?	Yes No	
Hydric Soils Present?	Yes No	
Remarks: Wetland		

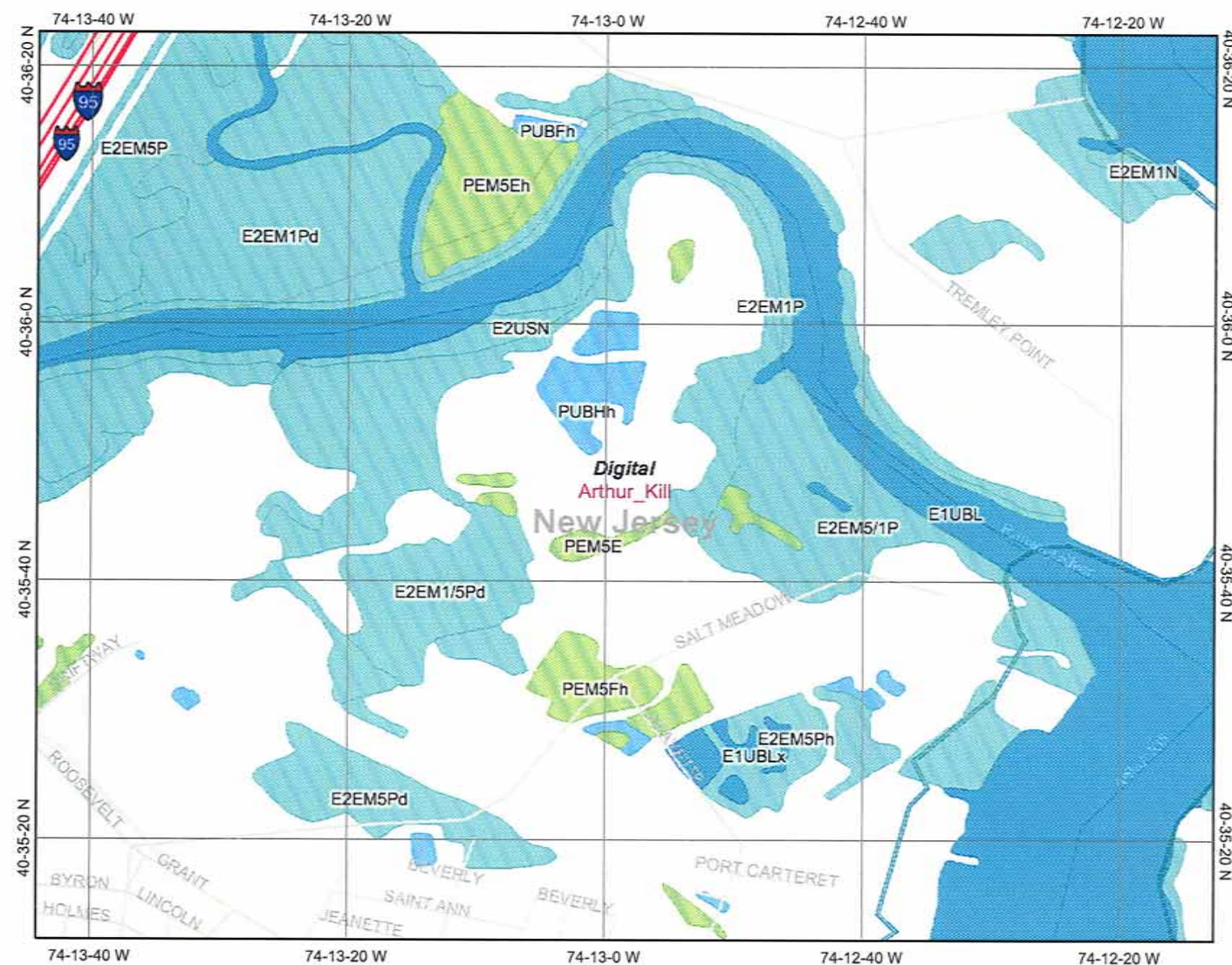
Approved by HQUSACE 3/92

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Appendix E

National Wetland Inventory Map

# Cytec Carteret Impoundment Facility



## Legend

**CONUS\_wet\_scan**

- 0
- 1
- Out of range

**Interstate**

**Major Roads**

Other Road

Interstate

State highway

US highway

Roads

Cities

USGS Quad Index 24K

**Lower 48 Wetland Polygons**

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

**Lower 48 Available Wetland Data**

- Non-Digital
- Digital
- No Data
- Scan

**NHD Streams**

- Counties 100K
- States 100K
- South America
- North America

Scale: 1:15,253

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Map center: 40° 35' 47" N, 74° 12' 58" W

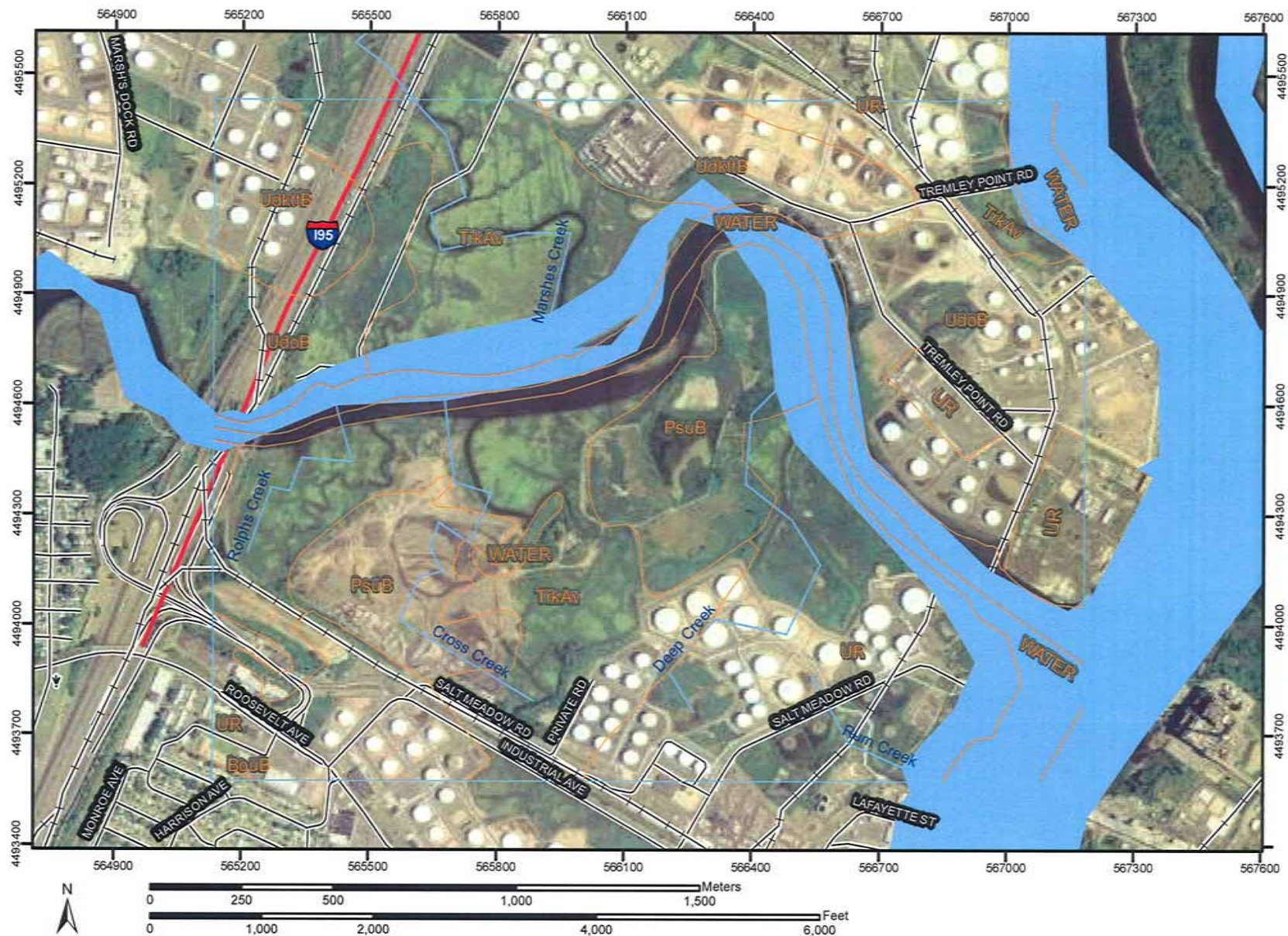


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Appendix F

USDA NRCS Middlesex County Soil  
Survey Map


Soil Map—Middlesex County, New Jersey, Richmond County, New York, and Union County, New Jersey  
(Cytec Carteret Impoundment Facility)



Soil Map—Middlesex County, New Jersey, Richmond County, New York, and Union County, New Jersey  
(Cytec Carteret Impoundment Facility)

## MAP LEGEND






















### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Units

### Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

 Very Stony Spot

 Wet Spot


 Other

### Special Line Features

-  Gully
-  Short Steep Slope
-  Other

### Political Features

#### Municipalities

-  Cities
-  Urban Areas

### Water Features

-  Oceans
-  Streams and Canals

### Transportation

-  Rails

#### Roads

-  Interstate Highways
-  US Routes
-  State Highways
-  Local Roads
-  Other Roads

## MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
Coordinate System: UTM Zone 18N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, New Jersey  
Survey Area Data: Version 6, Dec 7, 2006

Soil Survey Area: Richmond County, New York  
Survey Area Data: Not available

Soil Survey Area: Union County, New Jersey  
Survey Area Data: Version 4, Dec 7, 2006

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 3/29/1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Map Unit Legend

Middlesex County, New Jersey (NJ023)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BouB	Boonton-Urban land complex, 0 to 8 percent slopes	0.8	0.1%
PsuB	Psammments, waste substratum, 0 to 8 percent slopes	128.2	11.7%
TrkAv	Transquaking mucky peat, 0 to 1 percent slopes, very frequently flooded	178.5	16.3%
UR	Urban land	216.6	19.8%
WATER	Water	54.0	4.9%
Richmond County, New York (NY085)			
No soil data available for this soil survey area.			
Union County, New Jersey (NJ039)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
TrkAv	Transquaking mucky peat, 0 to 2 percent slopes, very frequently flooded	129.5	11.9%
UdktB	Udorthents, loamy substratum, 0 to 8 percent slopes	98.5	9.0%
UdoB	Udorthents, organic substratum, 0 to 8 percent slopes	182.2	16.7%
UR	Urban land	29.3	2.7%
WATER	Water	67.9	6.2%
Totals for Area of Interest (AOI)		1,092.2	100.0%

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Appendix G

Site Photographs

Photograph 1. Sample plot 1.



Photograph 2. Sample plot 2.



Photograph 3. Sample plot 3.





Photograph 4. Sample plot 5.



Photograph 5. Sample plot 8.



Photograph 6. Sample plot 10.

